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A
DICTIONARY
OF
Practical Surgery:

COMPREHENDING

ALL THE MOST INTERESTING IMPROVEMENTS, FROM THE EARLIEST TIMES DOWN TO THE PRESENT PERIOD;

AN ACCOUNT OF THE INSTRUMENTS, REMEDIES, AND APPLICATIONS EMPLOYED IN SURGERY;

THE ETYMOLOGY AND SIGNIFICATION OF THE PRINCIPAL TERMS;

AND

Numerous References to Ancient and Modern Works, forming together a "Catalogue Raisonnée" of Surgical Literature:

WITH

A VARIETY OF ORIGINAL FACTS AND OBSERVATIONS.

BY SAMUEL COOPER,

FORMERLY SURGEON TO THE FORCES; MEMBER OF THE ROYAL COLLEGE OF SURGEONS: OF THE MEDICAL AND CHIRURGICAL SOCIETY OF LONDON; AND OF THE MEDICAL SOCIETY OF MARSEILLES.

WITH

NOTES AND AN APPENDIX,

BY WILLIAM ANDERSON,

OF THE COLLEGE OF SURGEONS OF EDINBURGH; PROFESSOR OF ANATOMY AND PHYSIOLOGY TO THE VERMONT ACADEMY OF MEDICINE; AND LECTURER ON SURGICAL ANATOMY IN NEW-YORK.

◆

IN TWO VOLUMES.

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"A Dictionary of Practical Surgery: comprehending all the most Interesting Improvements, from the earliest times down to the present period; an Account of the Instruments, Remedies, and Applications employed in Surgery; the Etymology and Signification of the Principal Terms; and Numerous References to Ancient and Modern Works, forming together a "Catalogue Raisonnée" of Surgical Literature; with a Variety of Original Facts and Observations, by Samuel Cooper, formerly Surgeon to the Forces; Member of the Royal College of Surgeons; of the Medical and Chirurgical Society of London; and of the Medical Society of Marseilles. With Notes and an Appendix, by William Anderson, of the College of Surgeons of Edinburgh, Professor of Anatomy and Physiology to the Vermont Academy of Medicine, and Lecturer on Surgical Anatomy in New-York."

In conformity to the Act of the Congress of the United States, entitled "An Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the times therein mentioned." And also to an Act, entitled "An Act supplementary to an Act, entitled An Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies during the times therein mentioned, and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

JAMES DILL,
Clerk of the Southern District of New-York.

A

DICTIONARY

OF

PRACTICAL SURGERY.

This mark (*) will signify, that the Word which it precedes is further spoken of in the Appendix.

HE'RNIA. (From ἔρνος, a branch, from its protruding forward.) Surgeons understand by the term *hernia*, a tumour, formed by the protrusion of some of the viscera of the abdomen, out of that cavity, into a kind of sac, composed of the portion of peritoneum, which is pushed before them. However, there are certainly cases which will not be comprehended in this definition; either because the parts are not protruded at all, or have no hernial sac, as the reader will learn in the course of this article.

"The brilliant progress which surgery has made in modern times (says Scarpa) is, properly speaking, only the result of pathological anatomy, that is to say, of exact comparisons of the natural state of our organs with their different diseases, which may depend upon an alteration of texture, a derangement of functions, a solution of continuity, or a change of situation. It is from morbid anatomy, that the most rational curative methods, with which modern surgery is enriched, are deduced as so many corollaries; methods, to which we are also indebted for the perfection of operations.

"There are indeed a certain number of surgical operations, for the prompt and safe execution of which, mere anatomical knowledge will suffice; but in many others, the surgeon cannot promise himself success, even though he be well acquainted with anatomy, unless he has particularly studied the numerous changes of position, and alterations of texture, of which the parts, upon which he is about to operate, are susceptible. If he has not the requisite information upon all these points, false appearances may deceive his judgment, and make him commit mistakes, sometimes of a very serious and irreparable kind.

"In order to have a convincing proof of this truth, it will be sufficient to take a view of the different species of herniæ, and their numerous complications. Assuredly, no anatomist would believe, that the intestine cœcum, naturally fixed in the right ileum, and the urinary bladder, situated at the bottom of the pelvis, could undergo, without being torn, so considerable a displacement as to protrude through the abdominal ring, and descend even into the scrotum; that the same intestine, the cœcum, could pass from the right iliac region to the umbilicus, protrude at this opening, and form an umbilical hernia; that the right colon could have been found protruded from the abdomen at the left abdominal ring, and the left colon through the right one; that the liver, spleen, and ovary could sometimes form the contents of umbilical, inguinal, and femoral herniæ; that the cœcum could engage itself within the colon, and even protrude at the anus; that the stomach could be forced through the diaphragm, and form a hernia within the chest; that the omentum, or intestine, or both these parts together, could sometimes escape from the belly through the foramen ovale, or sacro-ischiatic notch of the pelvis; that a noose of small intestine, after being engaged in the abdominal ring, or under the femoral arch, could suffer the most violent strangulation, without the course of the intestinal matter being intercepted; lastly, that in certain circumstances, the intestine and omentum could be in immediate contact with the testicle, within the tunica vaginalis, without the least laceration of this latter membrane. These and several other analogous facts, says Scarpa, are so surprising, that they would yet be regarded as incredible, had they not been proved by numerous observations on individuals affected with hernia: their possibility (repeats this experienced professor) would not even have been suspected, either by the anatomist or physiologist." (See *Scarpa, Traité des Hernies, Pref.*)

The parts of the body, where herniæ most frequently make their appearance, are the groin, the navel, the labia pudendi, and the upper and forepart of the thigh; they do also occur at every point of the anterior part of the abdomen; and there are several less common instances, in which hernial tumours present themselves at the foramen ovale; in the perinæum; in the vagina; at the ischiatic notch, &c.

The parts, which, by being thrust forth from the cavity, in which they ought naturally to remain, mostly produce herniæ, are either a portion of the omentum, or a part of the intestinal canal, or both together. But the stomach, the liver, spleen, uterus, ovaries, bladder, &c. have been known to form the contents of some hernial tumours.

From these two circumstances of situation and contents, are derived all the different appellations, by which herniæ are distinguished. If a portion of intestine alone forms the contents of the tumour, the case is called *enterocele;* if a piece of omentum only, *epiplocele;* and if both intestine and omentum contribute to the formation of the tumour, it is called an *entero-epiplocele.* When the contents of a hernia protrude at the abdominal ring, but only pass as low as the groin, or labium pudendi, the case receives the name of *bubonocele,* or *inguinal hernia;* but if the parts descend into the scrotum, it is called an *oscheocele,* or *scrotal hernia.* The *crural,* or *femoral hernia,* is the name given to that which takes place below Poupart's ligament. When the bowels protrude at the navel, the case is named an *exomphalos,* or *umbilical hernia;* and *ventral* is the epithet given to the swelling, when it occurs at any other promiscuous part of the front of the abdomen. The *congenital rupture* is a very particular case, in which the protruded viscera are not covered with a common hernial sac of peritoneum, but are lodged in the cavity of the tunica vaginalis, in contact with the testicle, and, as must be obvious, it is not named like herniæ in general, from its situation, or contents, but from the circumstance of its existing from the time of birth.

When the protruded bowels lie quietly in the sac, and admit of being readily put back into the abdomen, the case is termed a *reducible hernia;* and when they suffer no constriction, yet cannot be put back, owing to adhesions, or their large size in relation to the aperture, through which they have to pass, the hernia is termed *irreducible.* An *incarcerated,* or *strangulated hernia,* signifies one, which not only cannot be reduced, but suffers constriction; so that if a piece of intestine be protruded, the pressure to which it is subjected, stops the passage of its contents towards the anus, excites inflammation of the bowel, and brings on a train of alarming, and often fatal consequences.

The causes of herniæ are either *predisposing,* or *exciting.* Among the former, writers mention a preternaturally large size of the openings, at which the bowels are liable to protrude; a weakness and relaxation of the margins of these apertures; a preternatural laxity of the peritoneum; an unusually long mesentery, or omentum, &c. With regard to the abdominal ring, the transverse tendinous fibres, which naturally cross and strengthen its upper and outer part, are much weaker in some subjects than others. No idea seems more prevalent in books, than that taking a good deal of oil with our food, is conducive to the formation of hernial diseases. Some of the alleged predisposing causes, may justly excite scepticism; but several circumstances tend to prove, that a natural deficiency of resistance, in any part of the parietes of the abdomen, promotes the occurrence of hernia. Hence, persons who have had the peritoneum wounded, are very liable to the present disease; (*Richerand Nosogr. Chir. T.* 3, *p.* 317; *Schmucker, Vermischte Chir. Schriften, B.* 1, *p.* 197,) and men are much more liable than women, to inguinal hernia, owing evidently to the larger size of the abdominal ring; while in women, as there is a larger space for the protrusion of the viscera, below Poupart's ligament, they are more exposed than men to femoral herniæ.

With regard to the *exciting* causes, our knowledge is involved in less doubt. The grand cause of this kind, is the powerful action of the abdominal muscles and diaphragm on the viscera. In feats of agility, such as jumping, &c. the pressure which the contents of the abdomen must often encounter, sufficiently accounts for their protruding at any part, where the abdominal parietes do not make adequate resistance. The same consideration explains, why herniæ very often take place in lifting and carrying heavy weights, running, vomiting, straining at stool, parturition, &c. and in people who inhabit mountainous countries.

This diminution of the capacity of the abdomen, by the action of the abdominal muscles and diaphragm, in many occasional exertions, must take place in every body by reason of the common habits and necessities of life. But as only a certain number of persons meet with the disease, it is fair to infer, that either the exciting causes must operate with greater force in them, than in the generality of people, or else that their abdominal parietes have not been capable of the ordinary degree of resistance. Many patients, who meet with herniæ, in making violent efforts and exertions, may be in the former circumstance; while others whose viscera protrude from such trivial things as coughing, sneezing, crying, &c. must be considered, as being under the influence of some predisposing cause. A gentleman, who has gained great honour by a most valuable treatise on hernia, remarks, that "herniæ, which originate in predisposition, generally come on gradually, and almost imperceptibly; while those which are produced by bodily exertions, are formed suddenly, and by the immediate action of the exciting cause. The occurrence of the complaint is often indicated, in the first instance, by a fulness, combined with a sense of weakness, about the abdominal ring. The swelling is increased by any action of the respiratory muscles, and disappears on pressure, and in the recumbent position of the body. It gradually finds its way through the tendon of the external oblique muscle, into the groin, and afterward into the scrotum. When a hernia takes place suddenly, it is generally attended with a sensation of something giving way at the part, and with pain." (*Lawrence on Ruptures, p.* 29, *Edit.* 3.)

Upon the subject of the immediate cause of herniæ, it is observed by Scarpa, that several distinguished modern surgeons, as, for instance, Warton, (*Adenograph. cap.* 11.) Benevoli, (*Dissertazioni Chirurgische,* 1.) Rossius, (*Acta Nat. cur. T.* 2, *Obs.* 178.) Brendel, (*de herniarum natalibus,*) and Morgagni, (*de sed. et caus. morb. epist.* 43, *art.* 13,) consider a relaxation and elongation of the mesentery as the principal cause of herniæ in general, and of the bubonocele in particular. Hence, say they, the whole mass of intestines, or only a portion of an intestine, descends against the inner orifice of the inguinal ring, presses against this opening, and gradually makes its way out of the abdomen. In examining this pathological point without prejudice, it is incontestable, says Scarpa, that an intestine cannot be moved beyond its natural limits, unless that part of the mesentery, which retains and fixes the bowel in its proper place, be at the same time elongated. But it does not follow from this, that a relaxation of the mesentery must precede the displacement of the intestine. It appears to Scarpa much more probable, that these two events are simultaneous, and depend upon one and the same cause.

"In the healthy state, the abdomen, considered altogether, is submitted to two opposite forces, which reciprocally balance each other. One is the pressure of the viscera against the abdominal parietes; the other is the reaction of the same parietes upon the viscera which they contain. If these two forces were in perfect equilibrium in all individuals, and under all the circumstances of life, we should not be in the least subject to herniæ. If, when the equilibrium has been broken, every point of the parietes of the belly were to yield equally to the impulse of the viscera, an increase of the volume of the whole abdomen would be the consequence; but a true hernia would never happen. The cavity of the abdomen is always completely full. The containing and contained parts react upon, and reciprocally compress one another. It is by the effect of this moderate, but equal and unremitting pressure, that all the viscera mutually support each other. Without it, the ligaments of the liver, those of the spleen, and the various membranous bands of the intestines in general, would only be feeble means for fixing such parts in their respective situations. But there are certain points of the abdominal parietes which naturally present much less resistance than others, and which react with much less power against the pressure made from within outwards by the abdominal viscera. Such is particularly the part which extends from the pubes to the anterior superior spinous process of the ilium. This relative weakness of some points of the abdominal parietes is very marked in certain individuals, in consequence of a defect of organization. It may also be increased by internal or external causes, which are as various as they are numerous. When in one of these cases the pressure made by the viscera is unusually increased, as happens in a violent effort, a defect in the equilibrium between the two forces above mentioned is occasioned; that is to say, the reaction of the abdominal parietes is no longer proportioned, at least at certain points, to the force of the impulse of the viscera. The conjoined powers of the abdominal muscles, diaphragm, and levator ani, are then directed and concentrated against the most feeble point of the abdomen, towards which they propel the nearest viscus, or that, which from its moveableness, is the most liable to displacement. If such viscus should happen to be the noose of an intestine, it is evident that the power which tends to make it protrude from the belly, must at the same time act upon the corresponding portion of the mesentery; and the intestine, in passing through the parietes of the abdomen, drags the mesentery after it, and makes this membrane yield and become elongated. When the displaced viscera meet with little resistance on the part of the parietes of the abdomen, the hernia is quickly formed, and the elongation of the mesentery occurs with equal celerity. We have an example of this in the inguinal congenital hernia: in this case the intestine is, in some measure, precipitated into a sac previously prepared for its reception. On the contrary, in the ordinary inguinal hernia, a totally different disposition of the parts renders the progress of the disease much slower. In most instances, the hernia is not formed immediately the equilibrium between the impulse of the viscera and the reaction of the abdominal parietes is broken. But in the groin, a slight elevation is first observed, in the direction from the anterior superior spinous process of the ilium towards the inguinal ring. Some time afterward, when the intestine has made its appearance on the outside of the ring, the enlargement of the hernia, and the elongation of the mesentery, make much more rapid, though always simultaneous progress.

"Numerous practical observations, (says Scarpa) concur in proving, that we must not search for the immediate cause of herniæ in the relaxation of the mesentery, but rather in a want of equilibrium between the pressure of the viscera and the resistance of one or several points of the abdominal parietes. Indeed herniæ are seen occurring from the slightest causes in infants, in whom the neck of the tunica vaginalis is not speedily obliterated, and in individuals, who from being fat, have all on a sudden become extremely thin. Such women as have had children, are more subject to the disease than others. Persons also of both sexes, who carry considerable burdens, or who play upon wind instruments, or who have suffered a forcible contusion of the abdomen, are particularly exposed to the disorder, even though there is not the least reason for suspecting in them a relaxation of the mesentery. Vaginal herniæ, which arise after difficult labours, afford another proof of the same truth: their cause is owing to a laxity and weakness of the parietes of the vagina, which, not being capable of making any further resistance to the pressure of the viscera, situated in the cavity of the pelvis, at length suffer these parts to protrude.

"With respect to the second proposition, that during the formation of a hernia, the combined force of all the abdominal muscles is, as it were, directed and concentrated against the most feeble point of the parietes, we see a proof of it in a fact that occurs to our observation every day. In order to convince ourselves of this, we need only notice what happens in individuals afflicted with herniæ: if they cough, or sneeze, or make the slightest effort, they instantly find the size of the swelling increased, and hasten to support the part with their hand. During the slightest efforts, which render the herniæ larger, it is also indisputable, that the mesentery is elongated in the same proportion as the intestine protrudes. All the viscera have such a tendency to be displaced and carried towards the weakest point of the parietes of the abdomen, that even those, which are naturally the most distant from it, and are the most firmly fixed by the folds of the mesentery, may in their turn descend into the herniæ. Anatomical knowledge alone would never have led us to have a suspicion of the possibility of these occurrences. Sandifort and Paletta have found, in an umbilical hernia, the cœcum, with a portion of the ileum and colon. (*Obs. Pathol. cap.* 4, & *Nova Gubernaculi testis Descriptio.*) Mauchart, Camper, and Bose, have met with the cœcum in an inguinal hernia of the left side. (*De Hern. Incarc. in Halleri Disput. Chirurg. Tom* 3. *Demonstrat. anat. patholog. lib.* 2, *p.* 18, & *Animadvers. de hern. inguin. p.* 5.) Lassus has seen the left colon protrude at the right inguinal ring. (*Médecine Operatoire, T.* 1, *p.* 173.) If it be proved by all these facts, that such viscera, as are the most closely united to the great sac of the peritoneum and neighbouring parts, are nevertheless liable to form herniæ; and if such displacements cannot happen without a considerable elongation of the membranous bands fixing these bowels, in their natural situation, how can we refuse to admit, that a noose of intestine, pushed by degrees through the inguinal ring, drags along with it the corresponding portion of the mesentery? In order to explain this event, there is no necessity for supposing a partial relaxation of the mesentery." (*Traité Pratique des Hernies, Par A. Scarpa, trad. de l'Italien, p.* 37—43.)

The general symptoms of a hernia, which is reducible, and free from strangulation, are an indolent tumour in some point of the abdomen, most frequently descending out of the abdominal ring, or from just below Poupart's ligament, or else out of the navel; but occasionally, from various other situations, as will be presently explained. The swelling often originates suddenly, except in the circumstances above related, and it is subject to a change of size, being smaller when the patient lies down on his back, and larger when he stands up, or holds his breath. It frequently diminishes when pressed, and grows large again when the pressure is removed. Its size and tension often increase after a meal, or when the patient is flatulent. In consequence of the unnatural situation of the bowels, many patients with hernia are occasionally troubled with colic, constipation, and vomiting. Sometimes, however, the functions of the viscera seem to suffer little or no interruption.

If the case be an *enterocele*, and the portion of intestine be small, the tumour is small in proportion; but, though small, yet, if the gut be distended with wind, inflamed, or have any degree of stricture made on it, it will be tense, resist the impression of the finger, and give pain upon being handled. On the contrary, if there be no stricture, and the intestine suffer no degree of inflammation, let the prolapsed piece be of what length it may, and the tumour of whatever size, yet the tension will be little, and no pain will attend the handling it; upon the patient's coughing, it will feel as if it were blown into; and, in general, it will be found very easily returnable. (*Pott.*) A guggling noise is often made when the bowel is ascending.

If the hernia be an *epiplocele*, or one of the omental kind, the tumour has a more flabby and a more unequal feel; it is in general perfectly indolent, is more compressible, and (if in the scrotum) is more oblong, and less round, than the swelling occasioned in the same situation by an intestinal hernia; and, if the quantity be large, and the patient adult, it is in some measure distinguishable by its greater weight. (*Pott.*)

If the case be an *entero-epiplocele*, that is, one consisting of both intestine and omentum, the characteristic marks will be less clear, than in either of the simple cases: but the disease may easily be distinguished from every other one, by any body in the habit of making the examination. (*Pott, P.* 28.)

As the smooth slippery surface of the intestine generally makes its reduction easier than that of the omentum, we may infer, with Mr. Lawrence, "that, if a portion of the contents slip up quickly and with noise, leaving behind something which is less easily reduced, the case is probably an entero-epiplocele. (See *Treatise on Ruptures, Edit.* 3, *p.* 32.)

On the subject of prognosis, Mr. Pott remarks, that the age and constitution of the subject, the date of the disease, its being free, or not free from stricture, or inflammation, the symptoms which attend it, and the probability or improbability of its being returnable, necessarily produce much variety.

If the subject be an infant, the case is not often attended with much difficulty or hazard, the reduction being easy as well as the descent; and though from neglect, or inattention, the bowel may fall down again, yet it is as easily replaced, and mischief seldom produced: Mr. Pott says seldom, because he has seen an infant, one year old, die of a strangulated hernia, which had not been down two days, with all the symptoms of mortified intestine. (For other examples of strangulated hernia in very young infants, refer to *Gooch's Chir. Works, Vol. 2, p 33*; *Lawrence on Ruptures, p. 65, Edit. 3*; *Edinb. Med. and Surgical Journal, Vol. 3, p. 470, &c.*)

"If the patient be adult, and in the vigour of life, the consequences of neglect, or of maltreatment, are more to be feared than at any other time, for reasons too obvious to need relating. The great and principal mischief to be apprehended, in an intestinal hernia, is an inflammation of the gut, and an obstruction to the passage of the aliment and feces through it; which inflammation and obstruction are generally produced by a stricture made on the intestine. In very old people, the symptoms do not usually make such rapid progress, both on account of the laxity of their frame, and their more languid circulation; and also that their ruptures are most frequently of ancient date, and the passage a good deal dilated; but then, on the other hand, it should also be remembered, that they are by no means exempt from inflammatory symptoms; and that if such should come on, the infirmity of old age is no favourable circumstance in the treatment, which may become necessary. (*Pott.*)

If the disease be recent, and the patient young, immediate reduction, and constant care to prevent another protrusion, are the only means whereby it is possible to obtain a perfect cure.

"If the disease be of long standing, has been neglected or suffered to be frequently down, and has given little or no trouble, the aperture in the abdominal muscle, and the neck of the hernial sac, may both be presumed to be large; which circumstances in general render immediate reduction less necessary and less difficult, and also frustrate all rational expectation of a perfect cure. On the contrary, if the rupture be recent, or, though old, has generally been kept up, its immediate reduction is more absolutely necessary, as the risk of stricture is greater from the supposed smallness of the aperture, and narrowness of the sac. If the rupture be very large and ancient, the patient far advanced in life, the intestine not bound by any degree of stricture, but does its office in the scrotum regularly, and no other inconvenience be found to attend it, but what proceeds from its weight, it will in general be better not to attempt reduction, as it will, in these circumstances, most probably prove fruitless, and the handling the parts in the attempt, may so bruise and injure them as to do mischief."

With respect to the correctness of the advice here delivered, some doubt may be entertained, because, though it would certainly not be right to protract the attempts at reduction, so as to do mischief, it must be equally wrong to make no trial, whether the hernia is reducible or not; and, if reducible, I should say, that it ought to be reduced without delay. and a truss applied. This opinion, however, seems to agree with the injunctions delivered by Pott in another place, as will be seen in the next section of this article.

With regard to the contents of a hernia, Mr. Pott observes, that "if it be a portion of omentum only, and has been gradually formed, it seldom occasions any bad symptoms, though its weight will sometimes render it very troublesome. But, if it be produced suddenly by effort or violence, that is, if a considerable piece of the caul by accident slip down at once, it will sometimes prove painful and cause very disagreeable complaints; the connexion between the omentum, stomach, duodenum, &c. being such as to render the sudden descent of a large piece of the first sometimes productive of nausea, vomiting, colic, and all the disagreeable symptoms arising from the derangement of these viscera. When the piece of caul is engaged in such a degree of stricture as to prevent the circulation of blood through it, it will sometimes, by becoming gangrenous, be the occasion of very bad symptoms and even of death, as I have more than once seen: and thus, as a mere omental hernia, it may sometimes be subject to great hazard. But even though it should never be liable to the just-mentioned evil, that is, though the portion of the caul should remain uninjured in the scrotum, yet it renders the patient constantly liable to hazard from another quarter; it makes it every moment possible for a piece of intestine to slip into the same sac, and thereby add to the case all the trouble and all the danger arising from an intestinal rupture. It is by no means an uncommon thing for a piece of gut to be added to a rupture, which had for many years been merely omental, and for that piece to be strangulated, and require immediate help.

"An old omental hernia is often rendered not reducible, more by an alteration made in the state of the prolapsed piece of caul, than by its quantity. It is very common for that part of the omentum, which passes through the neck of the sac, to be compressed into a hard, smooth body, and lose all appearance of caul, while what is below in the scrotum is loose and expanded, and enjoys its natural texture; in this case, reduction is often impossible, from the mere figure of the part; and I have so often seen this, both in the living and the dead, that I am satisfied, that for one omental rupture, rendered irreducible by adhesions, many more become so from the cause above-mentioned.

"In the sac of old omental ruptures that have been long down, and only suspended by a bag truss, it is no very uncommon thing to have a pretty considerable quantity of fluid collected: this, in different states and circumstances of the disease, is of different colour and consistence, and seldom so much in quantity as to occasion any particular attention to it; but, on the other hand, it sometimes is so much in quantity as to become an additional disease to the original one. I have more than once been obliged to let it out, in order to remove the inconvenience arising from its weight, and the distention of the scrotum, which I have also seen become gangrenous by the neglect of this operation.

"If the hernia be of the intestinal kind merely, and the portion of gut be small, the risk is greater, strangulation being more likely to happen in this case, and more productive of mischief, when it has happened: for the smaller the portion of gut is which is engaged, the tighter the tendon binds, and the more hazardous is the consequence. I have seen a fatal gangrene, in a bubonocele, which had not been formed forty-eight hours, and in which the piece of intestine was little more than half an inch.

Another observation made by Pott is, that "if the hernia be caused by a portion of the intestine ileum only, it is in general more easily reducible, than if a part of the colon has descended with it, which will also require more address and more patience in the attempt. The reduction of a mere intestinal hernia too (*cæteris paribus*) will always remain more practicable, than that of a mere omental one, after it has attained to a certain size and state, as the part contained within the former is liable to less alteration of form than that within the latter; which alteration has already been mentioned as no unfrequent hinderance of the return of an old caul rupture.

"Not that the parts within a mere intestinal hernia are absolutely exempt from such an alteration as may render their return into the belly impracticable, even where there is no stricture; for, says Pott, I have seen that part of the mesentery, which has lain long in the neck of the sac of an old rupture, so considerably hardened and thickened, as to prove an insuperable obstacle to its reduction."

Upon the whole, this author infers, that an intestinal rupture is subject to worse symptoms, and a greater degree of hazard, than an omental one, though the latter is, by no means, so void of either as it was formerly supposed to be; that bad symptoms are more likely to attend a recent rupture, than one of ancient date; that the descent of a very small piece of intestine is more hazardous than that of a larger; and that the hernia, which consists of gut only, is in general attended with worse circumstances, than that which is made up of both gut and caul.

Mr. Hey coincides with Pott, in thinking the prognosis more unfavourable when the tumour is small. I think it is not a bad general rule, that the smaller the hernia, the less hope there is of reducing it by the taxis. Long-continued efforts to reduce a prolapsed intestine, are most likely to succeed in old and large hernias, when no adhesions have taken place." (*Pract. Observ. in Surgery*, p. 203.)

"The opening (says Mr. Lawrence) through which the parts protude, is narrower in some situations than in others; the progress of the case will therefore be more rapid, and the danger of the patient more urgent. The aperture is generally very small in femoral hernia; this kind of rupture in men, and the bubonocele in women, have a particularly narrow entrance. On the same grounds, femoral, inguinal, and umbilical ruptures are more dangerous than the ventral, perineal, or vaginal kinds. (*Treatise on Ruptures, p. 63, Ed. 3.*)

TREATMENT OF A HERNIA CAPABLE OF EASY AND IMMEDIATE REDUCTION, AND NOT ATTENDED WITH ANY TROUBLESOME OR BAD SYMPTOMS.

"This case," says Mr. Pott, "is very frequently met with in infants, and sometimes in adults, and is too often neglected in both. In the former, as the descent seldom happens but when the infant strains to cry, and the gut is either easily put up, or returns *suâ sponte*, as soon as the child becomes quiet, it often is either totally unattended to, or an attempt made to restrain it only by a bandage made of cloth, or dimity, and which being ineffectual for such purpose, lays the foundation for future trouble and mischief.

"This is, in great measure, owing to a common opinion, that a young infant cannot wear a steel truss; a generally prevailing error, and which ought to be corrected. There is no age at which such truss may not be worn, or ought not be applied; it is, when well made, and properly put on, not only perfectly safe and easy, but the only kind of bandage that can be depended upon; and as a radical cure depends greatly on the thinness of the hernial sac, and its being capable of being so compressed as possibly to unite, and thereby entirely close the passage from the belly, it must therefore appear to every one who will give himself the trouble of thinking on the subject, that the fewer times the parts have made a descent, and the smaller and finer the elongation of the peritoneum is, the greater the probability of such cure must be.

"The same method of acting must, for the same reasons, be good in every age in which a radical cure may reasonably be expected; that is, the prolapsed parts cannot be too soon returned, nor too carefully prevented from falling down again, every new descent rendering a cure both more distant and more uncertain.

"As soon as the parts are returned, the truss should be immediately put on, and worn without remission, care being taken, especially if the patient be an infant, to keep the parts on which it presses constantly washed, to prevent galling.

"It can hardly be necessary to say, that the surgeon should be careful to see that the truss fits, as his success and reputation depend on such care. A truss which does not press enough, is worse than none at all, as it occasions loss of time and deceives the patient, or his friends; and one which presses too much, or on an improper part, gives pain and trouble, by producing an inflammation and swelling of the spermatic chord, and sometimes of the testicle.

"In adults, whose ruptures are of long standing, and accustomed to frequent descent, the hernial sac is generally firm and thick, and the aperture in the tendon of the abdominal muscle large; the freedom and ease with which the parts return into the belly when the patient is in a supine posture, and the little pain which attends a rupture of this kind, often render the persons who labour under it careless: but all such should be informed that they are in constant danger of such alteration in their complaint, as may put them into great hazard, and perhaps destroy them. The passage from the belly being open, the quantity of intestine in the hernial sac is always liable to be increased, and when down, to be bound by a stricture. An inflammation of that portion of the gut which is down, or such obstruction in it as may distend and enlarge it, may at all times produce such complaints as may put the life of the patient into imminent danger; and therefore, notwithstanding this kind of hernia may have been borne for a great length of time, without having proved either troublesome or hazardous, yet as it is always possible to become so, and that very suddenly, it can never be prudent or safe to neglect it.

"Even though the rupture should be of the omental kind, (which considered abstractedly is not subject to that degree or kind of danger to which the intestinal is liable) yet it may be secondarily, or by accident, the cause of all the same mischief; for while it keeps the mouth of the hernial sac open, it renders the descent of a piece of intestine always possible, and consequently always likely to produce the mischief which may proceed from thence.

"They who labour under a hernia thus circumstanced, that is, whose ruptures have been generally down while they have been in an erect posture, and which have either gone up of themselves, or have been easily put up in a supine one, should be particularly careful to have their truss well made, and properly fitted; for the mouth of the sac, and the opening in the tendon being both large and lax, and the parts having been used to descend through them, if the pad of the truss be not placed right, and there be not a due degree of elasticity in the spring, a piece of intestine will, in some posture, slip down behind it, and render the truss productive of that very kind of mischief which it ought to prevent." (See *Truss.*)

Mr. Pott then comments upon the importance of having the parts completely reduced before the truss is applied, and upon the danger that may be incurred by laying such bandage aside after it has been worn some time; since the partial closure of the ring, whereby the descent of the gut is rendered less easy, will also make the reduction more difficult, if a piece should happen to slip down; and hence he insists, that a truss "should be long, and unremittingly worn by all those, whose time of life makes the expectations of a perfect cure reasonable, many of the ruptures of adults being owing to the negligent manner in which children at school are suffered to wear their trusses."

Besides the danger of strangulation, and the loss of all chances of a radical cure, when a reducible hernia is neglected, and allowed to remain down, there are other motives for keeping up the tumour with a truss, and preventing its increase of size. "The vast size, to which neglected herniæ sometimes increase, not only prohibits all active exertion, but by involving, in the male, the integuments of the penis, incapacitates the subject from the act of copulation, and gives rise to excoriation from the discharge of the urine over the swelling. Probably too, the testis may be affected by the pressure of a very large scrotal hernia. (*Morgagni de Caus. et Sed. Ep.* 33, *Art.* 12; *Schmucker Vermischte Chir. Schriften, B.* 3, *p.* 195.) Disorders of the intestinal functions invariably attend these large ruptures, and increase in frequency and violence in proportion to the size of the swelling, and age of the patient. All the moveable viscera of the abdomen gradually find their way into the hernial sac, if a rupture be entirely neglected. (*Lawrence on Ruptures, p.* 67, *Edit.* 3, 1816.)

TREATMENT OF IRREDUCIBLE HERNIÆ, FREE FROM INFLAMMATION, AND UNATTENDED WITH TROUBLESOME OR DANGEROUS SYMPTOMS.

Mr. Pott, and all the best writers on ruptures, ascribe the incapacity of reduction, in most cases, either to the largeness of the quantity of the contents, an alteration made in their form and texture, or to adhesions, which they have contracted with each other, or their containing bag.

Mr. Pott was also aware, that ruptures are sometimes rendered difficult to be reduced, by the cœcum being contained in the hernial sac. Of which fact, he was as much convinced as the nature of such kind of things would permit; that is, by observations made both on the living and the dead. This statement, which was made by Mr. Pott very many years back, deserves particular notice, because its truth is confirmed by the modern observations of Scarpa, whose very important explanations of the cause of the difficulty of reduction, may be seen in the second vol. of the First Lines of Surgery.

Mr. Pott has adverted to the kind of impediment to reduction, produced by the thickening of the neck of the sac, when the hernia is long neglected, and suffered to remain in the scrotum, without any bandage to support its weight.

The same author reckons an alteration produced by time, and constant, though gentle pressure in the form and consistence, or texture of the omentum, as no infrequent cause, why neglected omental ruptures become irreducible.

When a portion of omentum "has been suffered to remain for a great length of time in the scrotum, without having ever been returned into the belly, it often happens, that, although that part of it, which is in the lower part of the hernial sac, preserves its natural soft, adipose, expansile state, yet all that part which passes through what is called the neck of the sac, is, by constant pressure, formed into a hard, firm, incompressible, carnous kind of body, incapable of being expanded, and taking the form of the passage in which it is confined, exactly filling that passage, and rendering it impossible to push up the loose part which fills the scrotum.

"The same reason for incapacity of reduction is also sometimes met with in ruptures of the intestinal kind, from an alteration produced on that part of the mesentery which has been suffered to lie quiet for a great length of time in the neck of an old hernial sac.

"The other impediment, which I mentioned to the return of old ruptures, is the connexion and adhesion of the parts, either with each other, or with the bag containing them. This is common to both the intestinal and omental hernia, and is produced by slight inflammations of the parts which have been permitted to lie long in contact with each other, or perhaps in many cases from the mere contact only. These adhesions are more or less firm in different cases, but even the slightest will almost always be found an invincible objection to the reduction of the adherent parts, by the hand only.

"Many, or perhaps most of these irreducible ruptures become so by mere time and neglect, and might at first have been returned; but when they are got into this state, they are capable of no relief from surgery, but the application of a suspensory bag, to take off or lessen the inconvenience arising from the weight of the scrotum.

"People in this situation should be particularly careful not to make any attempts beyond their strength, nor aim at feats of agility; they should take care to suspend the loaded scrotum, and to keep it out of the way of all harm from pressure, bruise, &c. When the tumour is very large, a soft quilted bolster should be worn at the bottom of the suspensory, to prevent excoriation, and the scrotum should be frequently washed for the same reason; a loss of skin in this part, and in such circumstances, being sometimes of the utmost importance. They ought also to be particularly attentive to the office of the intestinal canal, to see that they do not by any irregularity of diet disorder it, and keep themselves from being costive." Mr. Pott observes, however, that the quiet, inoffensive state of this kind of hernia is by no means to be depended upon; many things may happen to it, by which it may be so altered, as to become hazardous, and even fatal: an inflammation of that part of the gut which is down, any obstruction to the passage of the aliment or feces through it, a stricture made by the abdominal tendon, either on what has been long down, or on a new portion which may at any time be added to it, are always capable of so altering the state of the case, as to put the life of the patient into danger.

"Indeed the hazard arising from a stricture made on a piece of intestine contained in the sac of an old irreducible hernia, is in one respect greater than that attending one that has been found at times reducible; since from the nature of the case it will hardly admit of any attempt toward relief, but the operation, which in these circumstances must necessarily be accompanied with additional difficulty.

"Among the ruptures, which have been thought not reducible, and treated as such, there have been some which, upon more judicious and more patient attempts, have been found capable of reduction.

"When this is suspected to be the case, the proper method is by absolute rest, in a supine posture, for a considerable length of time, by great abstinence, and the use of evacuants, so as to lessen the size of the parts in the hernial sac, and render them capable of passing back again into the belly." (*Pott on Ruptures.*)

Fabricius Hildanus gives an account of a man who was radically cured of a rupture, of twenty years date, by six months confinement to bed. (*Cent.* 5, *Obs.* 54.)

Le Dran and Arnaud relate instances of monstrous bubonoceles, which disappeared entirely after the patients had been long confined to bed, and rendered much emaciated by tedious illnesses. Some of the moderns have imitated this operation of nature, and by frequent bleedings, and repeated purges, have sometimes so far reduced the size of the hernia, that it has been returned into the abdomen. Mr. Hey has several times succeeded in this way. (*P.* 219.) But the practice cannot prove successful, when the viscera adheres to the sac, or to the peritoneum, just within the abdomen. The greatest objection to this method of cure, is the want of an absolute criterion for distinguishing when the parts do, or do not adhere to the hernial sac, and in advanced years, though one were sure that the viscera were free from the sac, the possibility of hurting the body by the necessary evacuations, is also another objection. (*Sharp's Critical Inquiry*, *p.* 15.)

Were the plan to be thought worthy of trial, keeping up a constant pressure on the tumour, by means of a suspensory bandage, made to lace in front, would be proper for promoting the absorption of the thickened parts in the hernial sac. Mr. A. Cooper has reduced such herniæ, after applying ice to them, the good effects of which he imputes to its producing a contraction of the scrotum, and thus a strong and permanent compression of the tumour. Mr. Earle lately informed me of a method of keeping up a general pressure on the swelling, by means of a bladder containing quicksilver, the quantity of which can be regulated according to circumstances.

Whenever any attempts of this kind succeed, a truss should be immediately put on, and worn constantly without remission.

However, there are instances on record, where the capacity of the abdomen had become so adapted to the diminished quantity of the viscera, that when the contents of the hernia were reduced, serious complaints arose from their introduction into the belly. Schmucker met with several such cases, in which he was obliged to take off the truss again. Petit has known the reduction of a hernia of this kind prove fatal, the parts not descending again when the truss was removed, the nausea and vomiting continuing, and peritonitis taking place. (*Chirurgische Wahrnehmungen, Vol.* 2, *p.* 243. *Traité des Maladies Chir. T.* 2, *p.* 392.)

Mr. Pott remarks, that "an omental rupture, which has been so long in the scrotum as to have become irreducible, is very seldom attended with any bad symptoms, considered abstractedly; but it is constantly capable of being the occasion of an intestinal hernia, and all its consequences; neither is that all, for the omentum, either so altered in form and texture, or so connected as to be incapable of reduction, may by accident inflame, and either become gangrenous, or suppurate, and the occasion of a great deal of trouble." In a few instances, epiploceles produce very bad symptoms indeed, cases of which are to be found in Garengeot, Dionis, &c.

Sometimes, in old cases of entero-epiplocele, the intestine is reducible, but the omentum is not, in which case some writers advise keeping up the piece of bowel with a truss, the pad of which must be so contrived as not to press on the omentum. Mr. Pott, however, considers this method not often practicable, and should such a truss be used, he recommends great caution in its construction and application, lest a small piece of gut slip down, and being pressed on by the truss, produce fatal mischief.

"Irreducible herniæ must of course be exposed to all the consequences of external injury and violence; hence, various cases are recorded, in which the bowels have been burst by blows, falls, &c." (*Lawrence on Ruptures, p.* 110, *Edit.* 3.)

For examples of such accidents, Mr. Lawrence refers to *A. Cooper on Hernia, Part* 2, *Pref. p.* 2, *and to Travers's Inq. into the Process of Nature, &c. p.* 37. A case is also quoted from Scarpa, *p.* 310, where a violent exertion caused a sudden return of a hernia, which had been long regarded as cured. The viscera lay in the tunica vaginalis, which was burst to the extent of an inch.

SYMPTOMS AND TREATMENT OF A STRANGULATED, OR AN INCARCERATED HERNIA.—MEANS TO BE TRIED, BEFORE AN OPERATION.

"Difficulty of reduction (says Pott) may be owing to several causes. The size of the piece of omentum, or the inflamed state of it; the quantity of intestine and mesentery, an inflammation of the gut, or its distention by feces, or wind; or the smallness of the aperture of the tendon, through which the hernia passes. But to whatever cause it be owing, if the prolapsed body cannot be immediately replaced, and the patient suffers pain, or is prevented thereby from going to stool, it is called an *incarcerated hernia, a strangulated hernia,* or *a hernia with stricture.*

"The symptoms are a swelling in the groin, or scrotum, resisting the impression of the fingers: if the hernia be of the intestinal kind, it is generally painful to the touch, and the pain is increased by coughing, sneezing, or standing upright. These are the very first symptoms, and if they are not relieved, are soon followed by others, viz. a sickness at the stomach, a frequent retching, or inclination to vomit, a stoppage of all discharge per anum, attended with a frequent, hard pulse, and some degree of fever."

A patient, thus circumstanced, is in some danger, and demands immediate assistance. A stricture made on the prolapsed part of the gut, by the aperture through which it passes, is the immediate cause of all the bad symptoms, and of course, the removal of such stricture is the only thing which can bring relief. This object can only be accomplished by returning the bowel back into the abdomen, or dividing the parts which form the stricture. The former plan is always the most desirable, when practicable.

We next proceed to notice the various measures to be adopted for the relief of a strangulated hernia, so as to obtain the best chance of doing away the necessity of an operation. After treating of the merits of each plan, a few remarks will be offered on the order in which the means should be put in practice.

Taxis—This is the term applied to the operation of reducing a hernia with the hand. It is much promoted by the position of the body; which Winslow thought should be placed on an inclined plane, and the thighs bent towards the trunk. Mr. A. Cooper advises the same practice, observing, that this posture, by relaxing the fascia of the thigh, relaxes also the aperture, through which the hernia passes. Every degree of tension, and relaxation of the femoral fascia, must undoubtedly be attended with a corresponding change in the abdominal ring. But flexion of the thigh, besides relaxing this fascia, also relaxes the abdominal, internal iliac, and psoas muscles. In cases of inguinal hernia, the pressure made on the tumour by the hands of the surgeon, should always be directed upwards and outwards, along the course of the spermatic cord, and Mr. A. Cooper advises it to be continued from a quarter to half an hour. (*On Inguinal and Congenital Hernia.*)

As the femoral hernia passes downwards, and then forwards, the pressure must be directed first backwards, and then upwards. No violence should ever be used; for, besides being unavailing, it greatly aggravates the inflamed state of the contents of the hernial sac, and has been known even to burst the intestine. (See *Cooper on Inguinal Hernia, &c. p.* 23.)

Besides bending the thigh, care should also be taken to rotate it inwards, which will have great effect in relaxing the femoral fascia, and tendon of the external oblique muscle. Suspension of the patient over the shoulders of an assistant has been thought to facilitate reduction: "I have tried it often, (says Mr. Hey;) but have not found it to be of such superior efficacy, as some authors have represented." (*P.* 144.)

The return of a piece of intestine is generally preceded by a peculiar noise, caused by the passage of air through the stricture. It recedes at first gradually, and then slips up suddenly. The omentum goes up slowly to the very last portion, which must be actually pushed through the opening. If the taxis should not succeed at first, it will often do so after the warm bath, bleeding, or cold applications. Small herniæ, being attended with the closest stricture, are the most difficult to reduce, and for the same reason, crural ruptures do not so often yield to the taxis, as inguinal herniæ in the male subject. The taxis becomes less likely to succeed, the longer the inflamed viscera have been down, because adhesions are liable to form. Mr. Lawrence observes, (*p.* 63.) "When the rupture becomes painful, we are no longer justified in persevering in attempts at reduction by the hand. A sufficient pressure cannot now be endured; and the force which is employed only tends to increase the inflammation, and accelerate the approach of gangrene. *At this period the operation is required, and should be performed without delay.*" Desault even proscribed the taxis altogether in the inflammatory strangulation, until the previous use of other means had produced a change in the state of the swelling.

That the taxis is frequently abused, and the cause of serious mischief, is a truth which cannot be doubted. "Strangulated herniæ, (says Scarpa) very frequently mortify from the negligence of the patients, and their repugnance to submit to an operation, and perhaps, still more frequently from the effect of the taxis, unskilfully exercised by uninformed surgeons, who are determined, at any price whatsoever, to accomplish the speedy reduction of the viscera. The majority of them make no distinction between the *acute* and the *chronic* strangulation. In both cases, no sooner are the symptoms of strangulation evinced, than they begin to handle the swelling roughly, and to push the viscera with all their force, in order to make them return into the abdomen; whilst, when the strangulation is *acute*, and the patient young and strong, the taxis ought never to be practised, before all the means proper for diminishing the strength, calming spasm, and relaxing the parts which are to be reduced, have been employed for a certain time. These means, we know, are bleedings, fomentations, emollient clysters, and especially the warm bath, which, next to bleeding, holds the first rank. At this school of surgery, I have frequently had opportunities of observing the salutary effect of this treatment. My pupils have, more than once, seen herniæ, which had been painfully handled without any good, reduced, as it were, spontaneously, after a bleeding, or whilst the patient was in the bath. If what I have said upon the subject of the *acute* strangulation, and the treatment that it requires, were generally known by surgeons, I think that operations for strangulated herniæ would be less frequent. Things are different with regard to the *chronic* strangulation of old large herniæ, in feeble, or aged persons: for in these cases, it is of great importance to support the patient's strength. Bleeding, the warm bath, and other weakening means, should also be avoided, which, in producing a general atony, might bring on gangrene of the intestine, either during the strangulation, or after the reduction of the viscera. It is ascertained that these kinds of strangulation are almost always occasioned by an accumulation of fecal matter, or an extraordinary quantity of air in the hernia. Nothing is more efficacious than cold applications, for promoting the action of the bowel on the matter which distends it, or for lessening the volume of the air. They produce a corrugation of all the scrotum, and contractions of the cremaster, which alone sometimes suffice for reducing the viscera, in a much better manner than could be done by the hands of the most experienced surgeon." (*Scarpa, Traités des Hernies, p.* 244—247.)

Bleeding.—The inflammation which attacks the protruded viscera, and spreads thence over the whole abdomen, and the temporary weakness and often fainting, which the sudden loss of blood induces, and which is a peculiarly favourable opportunity for reducing the hernia by the hand, are the reasons in favour of bleeding. Sharp, Pott, B. Bell, Sabatier, Richter, Callisen, and Scarpa, names which can never be surpassed in respectability, are all subscribed in favour of bleeding. Wilmer, Alanson, and A. Cooper, have published against the practice. Mr. Hey has related two cases, which strongly evince the manner in which bleeding facilitates the return of a hernia: the protruded viscera, in one instance, went up spontaneously, on blood being taken away; in the other, the taxis succeeded immediately afterward, though the previous attempt had been made in vain. (*P.* 125, 126.) Mr. Hey's experience, however, leads him to concur so far with Wilmer and Alanson, as to declare, that bleeding has generally failed to procure a reduction of the strangulated intestine, though he is persuaded, that in many cases it may be used with advantage. But he cannot agree with Wilmer, that it generally renders the subsequent operation more dangerous (*P.* 126.) The majority of candid practitioners I believe will allow, that bleeding is always proper when the hernia is small and recent; the abdomen tense and painful; and the patient young, strong, and plethoric.

Purgative Medicines.—My experience, (says Mr. Hey) leads me to condemn almost universally the use of purgatives, while an intestine remains firmly strangulated. In the entero-epiplocele, when the intestine has retired, and the omentum remains strangulated: or in a simple strangulation of the omentum, where the intestine has not been prolapsed, purgatives are of great utility. So likewise in very large and old hernias, where there is reason to doubt, whether the disease is not to be considered as a morbid affection of the intestinal canal, rather than the effect of strangulation, purgatives may be as useful as in the simple ileus without hernia. While the intestine remains firmly strangulated, they usually increase the vomiting, and add to the distress of the patient. If they are to be tried at any time with hope of success, the trial would appear to have the greatest advantage when the vomiting has been removed by means of an opiate; yet I have repeatedly given them in vain during such an interval of relief. (*Practical Observations in Surgery p.* 128.)

Purgatives are supposed to operate by exciting the peristaltic action of the intestine, and thereby extricating it from the stricture. Besides the above eminent surgeon, Pott and Richter have joined in their general condemnation, and to all appearances, with very great reason. Purgative clysters certainly have not the objection of increasing the irritation; but their efficacy is not deserving of much confidence. Mr. Hey says, that he has never seen one case, in which either purgative, or emollient clysters, produced a return of a strangulated hernia. Such injections will empty the large intestines; but they do no more. It is common also for a natural evacuation to be the immediate consequence of strangulation. (*P.* 131.)

Warm Bath.—"Many instances (says Hey) are upon record of the good effect of warm bathing in procuring the reduction of a strangulated hernia. I have often seen it useful; but I have also often seen it fail. Whenever it is used in this disease, the patient should be placed, if possible, in a horizontal position. Gentle efforts with the hand to reduce the prolapsed part are perhaps attended with less danger, and with greater prospect of success, while the patient lies in the bath, than in any other position. The free use of opiates coincides with that of warm bathing, and under some circumstances, these means deserve to be tried in conjunction." (*P.* 132.)

Cold Bath, and Cold Applications.—The cold bath, and dashing of cold water on the patients, are little to be depended upon, though success has sometimes been obtained in this manner. (*Petit, Traité des Chir. T.* 2, *p.* 325; *Hey, p.* 136.)

Wilmer strongly recommended the application of cold to the tumour itself, and this plan has acquired the approbation of the most celebrated modern surgeons. It is generally tried in conjunction with the effect of tobacco clysters, which will be presently noticed. Cold applications, in the form of ice, were indeed particularly recommended by B. Bell. The best way is to pound the ice, tie it up in a bladder, and place it on the rupture. When ice cannot be procured, Mr. A. Cooper employs a mixture of equal parts of nitre and muriate of ammonia. To one pint of water, in a bladder, ten ounces of the mixed salts are to be added. "If, after four hours, (says this distinguished surgeon) the symptoms become mitigated, and the tumour lessens, this remedy may be persevered in for some time longer; but, if they continue with unabated violence, and the tumour resist every attempt at reduction, no farther trial should be made of the application." (*On Inguinal and Congenital Hernia.*) When ice is not at hand, æther sometimes proves a good substitute, when allowed to evaporate from the surface of the swelling.

Care must be taken, that the cold be not so applied as to freeze the scrotum, and bring on sloughing. (*A. Cooper, p.* 15.)

Opiates.—Mr. Hey met with several cases in which opiates, given freely, (in athletic persons after bleeding) procured a reduction of strangulated hernia.

He cannot say, however, that this remedy is generally successful; but it has the advantage of removing, for a time, the pain and vomiting usually attendant on strangulation, even though it prove ultimately inefficacious. Opiates should be given in large doses, when it is wished to try their effect in procuring reduction; and whenever the symptoms of strangulation return, after having been removed by opiates, the operation should be performed without delay. (*P.* 134, 135.)

Tobacco Clysters.—For this purpose, some surgeons prefer a decoction of tobacco, made by infusing, or boiling, one dram of the plant for ten minutes in a pint of water; others employ the smoke, which is prepared and introduced into the rectum by means of an apparatus, sold at almost every surgical instrument maker's. Perhaps both methods are equally efficacious; but, as one requires an apparatus, while the other does not, and is equally proper, the decoction may be entitled to most recommendation. The machine for the smoke is also frequently out of order. Next to the operation, tobacco clysters are the most certain means of bringing about the reduction of the strangulated parts. Besides exciting the action of the intestines, they exert a peculiar depressing influence on the whole system, reducing the pulse, and causing nausea and sickness, cold sweats and fainting, under which circumstances the parts often recede spontaneously, or may be easily reduced. Mr. A. Cooper prudently advises injecting half the above quantity at first; for he has seen two drams, and even one, when used as an infusion, and introduced at once, prove fatal. (*P.* 24.) The rest should be injected presently, when it appears that the tobacco does not operate with the extraordinary violence with which it does in a few particular constitutions.

A case recently published by Mr. C. Bell looks to me very much like an example of the occasional poisonous effects of the tobacco clyster, though not reported as such by the author. At least, no particulars of any fatal mischief, either in the tumour or abdomen, are detailed, and it is remarked of the patient: "His strength held up until the tobacco clyster was administered to him, after which he very suddenly fell low, and sunk." (*Surgical Obs. Part* 2, *p.* 189.) The smoke proved fatal in an instance witnessed by Desault, (*Œuvres de Chir. T.* 2, *p.* 344.) and an infusion of ʒij. to ℥viij. of water, seemed to produce sudden mortal effects in another example on record. (*Edinb. Med. and Surgical Journ. Vol.* 9, *p.* 159.)

Poultices and Fomentations have not the confidence of any experienced or intelligent surgeon. Whoever, in these urgent cases, wastes time in trying the effects of such applications, merits censure for his credulity, ignorance, and unfitness to undertake the treatment of a rapid disease, in which, as Pott remarks, if we do not get forward, we generally go backward; and whatever does no good, if it be at all depended upon, certainly does harm, by occasioning an irretrievable loss of time.

OF THE ORDER IN WHICH THE PRECEDING METHODS AND REMEDIES SHOULD BE TRIED, AND OF THE TIME WHEN THE OPERATION SHOULD NOT BE DELAYED.

In the treatment of a strangulated hernia, a surgeon cannot be too deeply impressed with the danger of spending time in the trial of methods of inferior efficacy, or of such as are evinced to be ineffectual in the cases before them.

The rapidity with which gangrenous mischief sometimes arises, and the patient loses his life, has been proved in a multitude of unfortunate examples, and should operate as a warning to all practitioners against the danger of deferring the operation too long. In the course of my reading, however, I have not met with so remarkable an instance of the sudden mortification, and rapidly fatal termination of a hernia, as the following case recorded by Baron Larrey, in speaking of the fatiguing and forced marches performed by the French soldiers in Egypt. These marches, he says, brought on in one case, "a hernia which formed suddenly, and became at the same time strangulated. The man was immediately brought to my ambulance; but a spontaneous gangrene, which had all on a sudden attacked the intestine, and extended to the other abdominal viscera, caused the patient's death in the space of two hours, and made it impossible for me to do the operation for him. This is the second example that I have been acquainted with, in which the effects of the accident were thus rapid." (*Larrey, in Mém. de Chirurgie Militaire, T.* 1, *p.* 196.)

The taxis is generally among the first things to be tried, and Mr. A. Cooper thinks the attempts should be continued for a quarter or half an hour. When these have been ineffectual, the patient, if the circumstances do not forbid, should be immediately bled, and have a large opening made in the vein, so that the suddenness of the evacuation may be most likely to bring on fainting. The taxis should then be tried again.

When the strangulation is very *acute*, and the patient young and strong, perhaps it may be most adviseable to follow the advice delivered by Scarpa and Desault, which is to bleed the patient and put him in the warm bath, before the taxis is attempted at all.

If bleeding alone has been practised, and the manual efforts at reduction should not now succeed, the warm bath may be employed, *provided it can be got ready in a very short time*, but none should ever be lost in waiting for it to be prepared. When the bath is used, the taxis may be attempted as the patient lies in the water; a situation in which I have succeeded in reducing several herniæ.

Certainly not more than one hour should ever be allotted for putting in practice the first attempts at reduction, bleeding, and the warm bath.

The plan should be, while the trial of one thing is going on, another should be preparing. So when the preceding measures have been tried in vain, the application of a bladder filled with ice, or the solution of nitre and muriate of ammonia, and the injection of tobacco, in the form of smoke or decoction, should never be delayed for want of due previous preparation of all the requisites. Both these measures should be practised at the same time, immediately after the failure of the taxis, bleeding, and the warm bath. Mr. A. Cooper computes, that four hours are enough for the trial of the tobacco clyster, together with cold applications.

In omental herniæ, the necessity for operating may frequently be obviated by the good effects of bleeding, purgative medicines, and clysters, and leeches applied to the tumour. Mr. Lawrence has justly observed, that "when, as it very frequently happens, the aid of the surgeon is not required until the complaint has lasted for some time, a trial of the tobacco, together with the topical use of cold, should be immediately resorted to, as circumstances will not admit of delay in the previous use of less powerful remedies. (*P.* 148, *Edit.* 3.)

Every man who has seen much of herniæ will immediately recognize the propriety of the following sentiments of the experienced Mr. Hey:

"I can scarcely press in too strong terms the necessity of an early recourse to the operation, as the most effectual method of preserving life in this dangerous disease. If Mr. Pott's opinion be true, that the operation, when performed in a proper manner, and in due time, does not prove the cause of death oftener than perhaps once in fifty times; it would undoubtedly preserve the lives of many, to perform it almost as soon as the disease commenced, without increasing the danger by spending much time in the use of means which cannot be depended upon for a cure.

"I have twice seen this disease prove fatal in about twenty-four hours. In such cases, it is evident there is little time for delay. A surgeon who is competent to perform the operation, is not perhaps consulted till the intestine is on the point of being mortified, or is actually in a state of mortification. The dilemma into which he is then cast is painful indeed. But, when the fullest opportunity is afforded him of using the best mode of treatment, I am satisfied that his success will be the greatest when the operation is not long delayed. This, at least, has been my own experience. When I first entered upon the profession of surgery, in the year 1759, the operation for the strangulated hernia had not been performed by any of the surgeons in Leeds. My seniors in the profession were very kind in affording me their assistance, or calling me into consultation when such cases occurred; but we considered the operation as the last resource, and as improper until the danger appeared imminent. By this dilatory mode of practice, I lost three patients in five, upon whom the operation was performed. Having more experience of the urgency of the disease, I made it my custom, when called to a patient who had laboured two or three days under the disease, to wait only about two hours, that I might try the effect of bleeding (if this evacuation was not forbidden by some peculiar circumstances of the case) and the tobacco clyster. In this mode of practice, I lost about two patients in nine, upon whom I operated. This comparison is drawn from cases nearly similar, leaving out of the account those cases in which a gangrene of the intestine had taken place.

"I have now, at the time of writing this, performed the operation thirty-five times; and have often had occasion to lament that I had performed it too late, but never that I had performed it too soon. There are some cases so urgent, that it is not adviseable to lose any time in the trial of means to produce a reduction. The delay of a few hours may cut off all hope of success, when a speedy operation might have saved the life of the patient." (*P.* 141, *&c.*)

To determine the exact moment, when to give up the trial of the preceding measures, and to have immediate recourse to the operation, is certainly difficult; but no one can doubt, that it is generally better to operate too early than too late.

All directions must be general ones, liable to many exceptions: in rapid cases, little or no time should be allotted to the trial of any plan, and the operation should be done without the least delay. In other instances, we have full time to try the effects of every thing at all likely to succeed. The symptoms, which ought to guide us, in having recourse to the operation, arise from an attack of inflammation in that part of the intestine contained in the hernial sac, and from its spreading into the abdominal cavity. It is in proportion to their violence, that we ought to urge the performance of the operation. Mr. A. Cooper considers pain on pressing the belly, and tension, as the symptoms which point out its immediate necessity. He adds, "Indeed, there is scarcely any period of the symptoms, which should forbid the operation; for, even if mortification has actually begun, the operation may be the means of saving life, by promoting the ready separation of gangrenous parts." (*On Inguinal and Congenital Hernia, p.* 27.)

Whenever the surgeon has succeeded in reducing the parts, without having recourse to the knife, if the symptoms of pain, inflammation, &c. ran high before such reduction, they will not always cease immediately afterward. As they probably depend on the reduced bowel having been inflamed by the stricture, the body should be kept open, and the diet and regimen should be low and sparing, whilst the least degree of pain and tension remain; in short, till all complaint is absolutely removed from the abdomen, and the intestines do their office freely, and without trouble. (*Pott.*)

PROGRESS OF THE SYMPTOMS OF A STRANGULATED HERNIA.

The earliest symptoms have been already related, viz. "tumour in the groin, or scrotum, attended with pain, not only in the part, but all over the belly, and creating a sickness and inclination to vomit, suppression of stools, and some degree of fever. These are the first symptoms, and, if they are not appeased by the return of the intestine, that is, if the attempts made for this purpose do not succeed; the sickness becomes more troublesome, the vomiting more frequent, the pain more intense, the tension of the belly greater, the fever higher, and a general restlessness comes on, which is very terrible to bear. When this is the state of the patient, no time is to be lost; a very little delay is now of the utmost consequence, and if the one single remedy, which the disease is now capable of, be not administered immediately, it will generally baffle every other attempt. This remedy is the operation whereby the parts engaged in the stricture may be set free. If this be not now performed, the vomiting is soon exchanged for a convulsive hiccough, and a frequent gulping up of bilious matter; the tension of the belly, the restlessness and fever having been considerably increased for a few hours, the patient suddenly becomes perfectly easy, the belly subsides, the pulse, from having been hard, full, and frequent, becomes low, languid, and generally interrupted; and the skin, especially that of the limbs, cold and moist; the eyes have now a languor and a glassiness, a lack-lustre not easy to be described; the tumour of the part disappears, and the skin covering it sometimes changes its natural colour for a livid hue; but whether it keeps or loses its colour, it has an emphysematous feel, a crepitus to the touch, which will easily be conceived by all who have attended to it, but is not so easy to convey an idea of by words: this crepitus is the too sure indicator of gangrenous mischief within. In this state the gut either goes up spontaneously, or is returned with the smallest degree of pressure; a discharge is made by stool, and the patient is generally much pleased at the ease he finds; but this pleasure is of short duration, for the hiccough and the cold sweats continuing and increasing, with the addition of spasmodic rigours and subsultus tendinum, the tragedy soon finishes." (*Pott.*)

ANATOMY OF INGUINAL HERNIA.

This subject must necessarily precede the account of the operation, which would otherwise be unintelligible. It is chiefly in the anatomical information, relative to herniæ, and in the mode of operating, that modern surgeons have a decided superiority over their predecessors; for before Gimbernat, Camper, Hey, Lawrence, Cooper, Scarpa, and Hesselbach, published their several works on herniæ, the anatomy of the disease was only imperfectly understood.

The tendinous fibres of the aponeurosis of the external oblique muscle, as they run downwards and forwards towards the pubes, separate from each other, so as to leave a triangular opening, called the abdominal ring, which is usually more capacious in the male than the female subject. The upper and inner pillar (as it is termed) of this aperture is inserted into the symphysis of the pubes, and is the weakest of the two; the lower and outer one, which is the strongest, is chiefly a continuation of Poupart's ligament, (*Hesselbach, über den Ursprung, &c. der Leisten-und-Schenkelbrüche, p.* 4.) and is fixed into the angle and crista of the same bone. Some tendinous fibres cross the upper and outer angle of the ring, so as to diminish the triangular appearance of the whole aperture: these are said to be very strong in old herniæ. The anterior and thicker layer of the aponeurosis of the internal oblique muscle joins the tendon of the external oblique; the posterior and thinner one joins that of the transversalis; but the lower portion of this tendon, together with the corresponding part of the transversalis, goes wholly in front of the rectus muscle. Thus the inferior border of the obliquus internus and transversalis, which originates from the upper part of Poupart's ligament, lies behind the outer pillar of the abdominal ring. Mr. A. Cooper first noticed, that a thin fascia proceeds from the inner edge of Poupart's ligament, and spreads over the posterior surface of the transversalis. This fascia forms the only partition between the peritoneum and the outer opening of the abdominal ring, and were it not for its existence, inguinal herniæ would probably be much more frequent. The partition in question, however, is said by Scarpa to be formed by the aponeuroses of the internal oblique and transverse muscles, while Hesselbach, who has named the small smooth point, situated directly behind the outer opening of the abdominal ring, its *crural surface*, distinctly states, that it is formed by delicate fleshy and tendinous fibres of the internal oblique muscle; (*Ueber den Ursprung, &c. der Leisten-und-Schenkelbrüche, p.* 4,) and that behind them is the weakest part of what he names the *internal inguinal ligament*, in the rear of which is the peritoneum, with the intervention of a very loose cellular substance. (*Op. cit. p.* 26.) The *internal inguinal ligament* of Hesselbach, is therefore clearly the same thing as the above fascia pointed out by Mr. A. Cooper. This point of the abdomen is one of the three weak places on the inside of the inguinal region, where herniæ are liable to occur; yet, weak as it appears to be, it is not the most common situation of such tumours. A computation has been made, that in an hundred cases of inguinal hernia, not ten occur at the point here specified. (*H. J. Brünninghausen, Unterricht über die Brüche, &c. Wurzb.* 1811.)

The spermatic vessels, joined by the vas deferens, run in front of the epigastric artery, very near the place of its origin. They then pass through the above fascia, go under the edge of the internal oblique and transverse muscles, and next obliquely downwards and forwards, between the above fascia, and aponeurosis of the external oblique muscle to the opening of the ring. When arrived on the smooth surface, immediately behind the ring, they describe an obtuse angle, and pass forwards and downwards into the scrotum. (*Hesselbach op. cit. p.* 5.)

Thus we see, that the spermatic cord, before it actual emerges at what is named the abdominal ring, runs through a kind of canal, to which the epithet *inguinal* is often applied. This oblique passage of the cord through the abdominal parietes, was well known to, and elegantly delineated by Albinus; Gimbernat makes distinct mention of it in his *Account of a new Method of Operating for Femoral Hernia, p.* 19, 32; but Mr. A. Cooper has the merit of having given the earliest correct account of the inguinal canal, in reference to hernia; a subject rendered complete by the more recent elucidations of Hesselbach and Scarpa.

The abdominal ring is then only the outer opening of the canal, or passage, through which the spermatic cord passes before it emerges. The inner one, at which the viscera first protrude in the most common cases of inguinal hernia, is situated about an inch and a half from the abdominal ring, in the direction towards the anterior superior spinous process of the ilium; or, according to Hesselbach, the inguinal canal is almost an inch and a half in length, the average distance of the outer pillar of the abdomina ring, from the inner pillar of what he terms the posterior ring, being about sixteen lines. (*Op. cit. p.* 14.) This inner opening is rather nearer the pubes than the ilium, and its upper border is formed by the lower edge of the internal oblique, and transverse muscles, which can be plainly felt with the finger, introduced upward and outward into the abdominal ring.

"The precise point at which the hernia most commonly begins, (says Scarpa,) is that which corresponds, in the fœtus, to the communication of the tunica vaginalis with the peritoneum, and, in the adult, to the passage of the spermatic cord under the transverse muscle. In the sound state, the peritoneum presents at this part a small funnel-like depression, the depth of which increases in proportion as the spermatic cord is pulled from above downwards. It is this small pouch, this sort of digital appendage, whose progressive augmentation constitutes the hernial sac. Resting upon the anterior surface of the spermatic cord, it first makes its appearance under the inferior edge of the transverse muscle; thence it extends itself in the separation of the inferior fleshy fibres of the internal oblique muscle, always following the spermatic cord, in front of which it is situated; and after having in this manner passed through the whole of the canal, which extends from the iliac region to the pubes, it lastly protrudes at its external orifice, which is the inguinal (or abdominal) ring, properly so called. In all this track, the hernial sac, as well as the spermatic cord, is situated above the femoral arch, the direction of which it follows. The canal, which it traverses, is of a conical shape, the apex of which is towards the flank, and the base at the external orifice of the ring." (*Scarpa, Traité des Hernies, p.* 44, 45.)

The epigastric artery runs behind the spermatic cord, along the inner margin of the internal opening of the above canal, then upwards and inwards, so as to pass at the distance of half an inch or an inch from the upper extremity of the outer opening, or abdominal ring.

In common cases of inguinal hernia, the viscera, protruded at the inner opening of the inguinal canal, lie over the spermatic cord, and form a tumour on the outside of the abdominal ring.

When the viscera have entered the above described digital pouch of the peritoneum, but do not protrude through the abdominal ring, the case is sometimes termed an *incomplete inguinal hernia;* and *complete* when they pass out of that opening. The viscera may continue for a long while quite within the inguinal canal, and even become strangulated there: sometimes, also, they are prevented from passing further towards the ring by some kind of impediment; and, in this circumstance, if the hernial sac have any addition made to its contents, it may expand between the external and internal oblique muscles, as Hesselbach had an opportunity of seeing in the body of a female. (*Ueber den Ursprung, &c. der Leisten-und-Schenkelbrüche, p.* 28.) The stricture may take place either at the internal or external opening of the inguinal canal. In recent and small hernia, according to Mr. A. Cooper, the strangulation is most frequently situated at the inner opening; in large old ruptures, at the abdominal ring. Even when the parts are completely protruded out of the latter opening, the strangulation may exist at the inner one; but there may occasionally be two strictures, viz. one at each opening. (See *Lawrence on Ruptures, p.* 183, *Edit.* 3.)

The hernial sac descends through the abdominal ring over the spermatic cord, and is covered by a fascia, sent off from the tendon of the external oblique muscle. Beneath this fascia, the cremaster muscle is also situated over the sac, which, after it has descended a certain way, lies on the tunica vaginalis, as well as the spermatic cord.

As the epigastric artery naturally runs first behind the spermatic cord, and then along the inner margin of the internal opening of the ring, and as the viscera are protruded over the cord, they must be situated on the outer side of the artery, which runs first behind the neck of the sac, and then on its inner side. Hence, the inner margin of the sac, when inspected on the side towards the abdomen, seems to be formed, as it were, by the track of the vessel. (See *Lawrence, p.* 179.) That this is the ordinary situation of the epigastric artery, in relation to the inguinal hernia, is confirmed by the concurrent testimonies of Camper, Chopart, Desault, Sabatier, A. Cooper, Hesselbach, Scarpa, &c. and by preparations to be seen in almost every museum.

In recent inguinal herniæ, the internal and external openings of the ring are at some distance from each other, the first being situated obliquely upwards and outwards in relation to the former; but the pressure of the protruded viscera, gradually forces the internal opening more towards the pubes, and nearer to the abdominal ring, so as to render the posterior side of the neck of the hernial sac, and of the inguinal canal, very short. (*Hesselbach, p.* 29.) Thus, in large herniæ of long standing, the opening into the abdomen is almost direct, and the epigastric artery becomes situated nearer the pubes, than in the natural state.

Though such is the ordinary direction, in which a bubonocele protrudes, there are occasional varieties. In one of these, the viscera, instead of descending through the canal of the ring, are at once thrust through the abdominal ring itself, and the opening into the belly is then direct: the hernial sac, instead of passing on the external side of the spermatic vessels, as is usual, now lies on their inner, or pubic side; and the epigastric artery, which is commonly situated behind, now pursues its course, in front of the sac, at its usual distance from the upper and outer angle of the abdominal ring.

The following is Scarpa's description of the displacement of the epigastric artery in the greater number of cases of inguinal hernia. "This artery, which in the natural state, runs about ten lines from the abdominal ring, has its situation and direction so changed, in subjects affected with hernia, that it crosses the posterior part of the neck of the hernial sac, and is pushed from the outer to the inner side of the abdominal ring. In order to comprehend the reason of this displacement, it is necessary to recollect what I have elsewhere said of the formation of inguinal hernia, and of the manner, in which the spermatic cord crosses the epigastric artery. The hernia begins to form at the very place, where the spermatic cord passes under the inferior margin of the transverse muscle; and this place is rather nearer the flank, than that where the epigastric artery passes towards the rectus muscle. In its progressive extension, the hernial sac constantly follows the same track as the spermatic cord, since it is situated upon its anterior surface. As has been already explained, this cord crosses the epigastric artery; consequently, the hernial sac must necessarily pass with the cord above this artery, before protruding from the canal of the abdominal ring. At the same time, the internal orifice of the hernia becoming larger, and the inguinal canal shortened by the approximation of its two orifices to each other, it follows, that at the period when the hernia begins to make its appearance in the groin, the epigastric artery is unavoidably situated behind the neck of the hernial sac, and is pushed from the outer to the inner side of the ring. Let us suppose a piece of string to be passed from the inside of the abdomen into the scrotum, all through the inguinal canal, and the middle of the hernia; and that this string is pulled so as to bring the internal orifice of the hernia, which is situated beyond the point where the spermatic cord crosses the epigastric artery; this artery will immediately be found to be carried from the outer to the inner side of the neck of the hernial sac. The same thing happens from the effect of the enlargement of the hernia. The removal of the epigastric artery from one side of the ring to the other, (says Scarpa) is a phenomenon, which may be regarded as almost constant in the inguinal hernia. I have examined the bodies of a great number of subjects, affected with this species of hernia; and it has been only in a very few, that I met with the epigastric artery retaining its natural situation on the outer side of the abdominal ring. In investigating the reason of this exception, I have observed, in all the individuals who presented it, a very remarkable weakness and flaccidity of that part of the abdominal parietes, which extends from the flank to the pubes. In all *the displaced viscera had passed through the aponeuroses of the transverse and internal oblique muscles*, not in the vicinity of the ilium, as is commonly the case, but, *at a little distance from the pubes*, giving to the upper pillar of the ring a curvature that is extraordinary, and disproportioned to the smallness of the hernia. I observed, also, that the neck of the hernial sac did not pass in an oblique direction, from the flank to the pubes, but, that it protruded from the abdomen almost in a direct line from behind forwards. In short, in these individuals, the small cul-de-sac of the peritoneum, which constitutes the origin of the hernial sac, had not begun to be formed under the edge of the transverse muscle, at the point where the spermatic cord runs outward; but, *it had passed through the aponeuroses of the internal oblique and transverse muscles, at a little distance from the pubes, and within the point at which the spermatic cord crosses the epigastric artery.* The small hernial sac, having at this part come into contact with and united to the spermatic cord, protrudes at the external orifice of the inguinal canal, without displacing the epigastric artery from its natural situation.

This species of hernia, properly speaking, is a mixture of the ventral and inguinal. It resembles the former, inasmuch as the hernial sac pierces the aponeuroses of the transverse and internal oblique muscles; the latter, inasmuch as it passes out at the abdominal ring, conjointly with the spermatic cord." (*Scarpa, Traité des Hernies, p.* 68, *&c.*)

Hesselbach particularly adverts to a *triangular space* to be seen on the inside of the inguinal region: the upper boundary of it is formed by the outer edge of the rectus muscle; the lower by the horizontal branch of the os pubis; and the external shortest boundary by the crural vein and epigastric artery. Now, says he, when it is considered, that this artery ascends obliquely inwards, between the inner opening of the ring, and the above triangular space, one cannot fail to know on which side of the neck of the sac the artery must lie in the two species of inguinal, as well as the crural, hernia; for, in those herniæ, which originate in the above triangular space, this artery lies at the outer side of the neck of the hernial sac; while, in every hernia that takes place through the inner opening of the inguinal canal, the same vessel is situated at the inner side of the neck of the sac. To one species of bubonocele, Hesselbach applies the epithet *external;* and to the other, *internal;* according to the situation of the point at which they first protrude. The external inguinal hernia is much more frequent than the internal, and is said to happen oftener on the right, than the left side of the body: a circumstance, coinciding with another observation, viz. that in children, the tunica vaginalis remains longer open on the right than the left side.

The circumstance of there being two forms of inguinal hernia formerly caused considerable perplexity: surgeons knew, that the epigastric artery lay sometimes at the inner, sometimes at the outer side of the neck of the hernial sac, but knew not how to account for this variation. Hence arose the very different opinions about the proper method of dividing the ring when the hernia was strangulated; some authors directing the incision to be made obliquely inwards and upwards; and others, upwards and outwards. But, as a modern writer has judiciously remarked, had they paid greater attention to the direction of the swelling, formed by the neck and body of the hernial sac in the groin, and to the position of the spermatic cord, which is as inconstant as that of the epigastric artery; and had they dissected the parts in the diseased, as well as healthy, state, they could not fail soon to have suspected, that every inguinal hernia does not originate exactly at one and the same point. For the first establishment of this very important distinction, the world is indebted to Mr. A. Cooper; and the tract, in which Hesselbach pointed out the fact in a very particular manner, I believe, is the next publication in which the subject is explained. (*Anat. Chir. Abhandlung über den Ursprung der Leistenbruche, Wurzb.* 1806; *and Neuste Anat. Pathol. Untersuchungen über den Ursprung, &c. der Leisten-und-Schenkelbrüche,* 4*to. Wurzb.* 1814, *p.* 18, 26, 28, *&c.*) According to the latter author, since each form of inguinal hernia also presents characteristic appearances externally, the surgeon can have no difficulty in determining the species of hernia; which discrimination must be highly important in the taxis, the application of a truss, and especially the operation. The sac of the external scrotal hernia can only pass down within the expansion of the cremaster as far as this part is separate from the cord and tunica vaginalis. Hence, the testis, covered by its tunica vaginalis, lies under the lowest part of the hernial sac, while the vessels of the spermatic cord, in a more or less separated form, are situated behind the posterior part of the sac; viz. the spermatic veins externally, and the vas deferens internally, and the artery in the middle. Should the hernia descend still further, the testis being included as well as the sac within the tendinous expansion of the cremaster, it cannot glide out of the way, but must be pressed still further downwards by the sac, so as to continue invariably under its fundus, but sometimes inclined a little behind it. (*Hesselbach, p.* 34.) And, as the same author justly observes, the position of the spermatic cord and testis, and the oblique direction of the swelling in the external species, are the two strongest characters by which every case of inguinal hernia may be discriminated.

Although the spermatic cord commonly lies behind, or under, the hernial sac, there are cases in which the vas deferens is found on the outer side of it, while the rest of the spermatic cord lies, as it usually does, on the inner side, or rather under it. (*Cooper.*) Le Dran, Schmucker, and Blizard, found the whole cord situated in front of the sac. Sometimes the vas deferens runs on the front and inner part, and the rest of the cord on the back and external part of the swelling. (*Camper, Hey.*) The cord has been known to be before, and the vas deferens behind, the sac. (*Camper, A. Cooper.*)

Upon this part of the subject, the reader may deem the following passage interesting. "While the hernia is of moderate size, (says Scarpa) the surrounding cellular substance is not very greatly compressed, and no change is observed in the situation of the spermatic vessels. The artery and veins of this name always form, with the vas deferens, one single cord, which is intimately adherent to the posterior surface of the hernial sac. But, in proportion as the tumour increases in size, the cellular substance, which immediately surrounds it, and unites it to the spermatic cord, is more and more distended and compressed. At length, at a certain period, the distention is carried to such a pitch, that the spermatic vessels are separated from one another, and change their position with respect to the hernial sac. This kind of gradual unravelling of the spermatic cord is quite similar to that, which would be produced by pulling the surrounding cellular substance in two opposite directions. Such is the reason, why in scrotal hernia of large size, the spermatic artery, the vas deferens, and the spermatic veins are found separated upon the posterior surface of the sac. All these vessels, instead of being conjoined in one cord, are divided by interspaces, which are sometimes very considerable. Ordinarily, the vas deferens is less separated from the spermatic artery, than from the vein of this name. In some subjects, Camper has seen it situated on one side of the sac, and the artery and veins on the other. (*Icones Herniarum, Tab.* 5, *L. O. Tab.* 8. 1, 2.) The displacement and splitting of the spermatic cord take place equally in adults and in children affected with large scrotal herniæ. (*Camper, loco cit.*) In general, towards the upper part and neck of the hernia, the vessels are not much separated; but as they proceed downwards, they diverge more and more. Sometimes, when the hernia is very old and bulky, they are no longer found at the posterior part, but rather at the sides, and even on the front surface of the sac; they show themselves through the cremaster muscle, which covers them, and form a sort of vascular train, which arrests the hand of the operator at the moment when he is about to open the hernial sac. Le Dran relates, that in operating upon a large scrotal hernia, he found the spermatic cord on the anterior surface of the hernial sac. (*Operations de Chir. p.* 127.) This fact has been the cause of numerous conjectures, and has appeared altogether inconceivable to such surgeons as have not been acquainted with the changes, to which the spermatic cord is exposed, in cases of large scrotal herniæ. (Lassus could not (*Med. Operat. T.* 1, *p.* 152,) conceive the possibility of the occurrence.) The observation of Le Dran is not the less true and exact; it exemplifies a very important fact, of which it is easy to give a true explanation when the state of the spermatic cord in ordinary inguinal herniæ, and in those which have obtained a considerable size, has been comparatively examined. In the first, the spermatic cord quite entire is always found situated on the posterior surface of the hernial sac; but, in the second, the spermatic vessels are so separated from one another, that they sometimes extend over the sides and even the forepart of the hernial sac." (*Scarpa, Traité des Hernies, p.* 61, *&c.*)

The hernial sac is commonly described as an elongation of peritonæum. When more minutely examined, however, it is found, in cases of inguinal hernia, to consist of the portion of peritonæum, pushed out with the viscera; of a layer of cellular substance on the outside of this, which becomes more or less thickened by the pressure of the rupture in different cases; of a fascia, sent off from the tendon of the external oblique muscle; and of the cremaster muscle, which latter parts form the exterior covering, which consisting of several layers, often leads the operator to fancy that he has opened the cavity of the sac, when, in reality, he has not.

It is observed by Professor Scarpa, that "the cremaster muscle, in cases of old large scrotal herniæ, acquires a thickness, which is really surprising. Its fibres, which are naturally very thin, become from four to six times more considerable. Being spread over the neck and body of the hernial sac, they sometimes present a remarkable consistence, and a yellowish colour. Such alteration, however, does not prevent the muscular texture from being discovered, and Haller was not mistaken about it. (*Opusc. Patholog. p.* 317.) Pathology furnishes us with several examples of similar changes of organization. In certain cases, the muscular coat of the bladder, that of the stomach and intestines, and even the exceedingly delicate fleshy fibres of the ligaments of the colon, are found to have become yellow, and much thickened.

"In old scrotal herniæ (says Scarpa) it is not unusual to find an intimate adhesion of the fibres of the cremaster muscle to the edges of the abdominal ring. This may depend on the pressure, which the contents of the hernia makes on those edges, and perhaps it may also depend on the union of the cremaster muscle with the prolongation of the aponeurosis of the fascia lata, which is continued from the margins of the ring to the groin and scrotum. Howsoever it may be, certain it is, that in old large scrotal herniæ, there is much difficulty in introducing a probe between the fleshy fibres of the cremaster and the margin of the abdominal ring; and that, on the contrary, in recent herniæ, a probe passes as easily between the edges of the ring and the cremaster, as between this muscle and the hernial sac.

"Few authors (according to Scarpa) have spoken of the sheath, formed by the cremaster muscle, in which are enclosed the hernial sac, the spermatic cord, and the tunica vaginalis of the testicle. Sharp (in *Critical Inquiry*) and Monro, the father, (*Anat. and Chirurg. Works, p.* 553.) were the first to dwell upon this important pathological point. Monro had seen the cremaster muscle covering the hernial sac; but he did not believe, that the same thing occurred in all individuals affected with inguinal hernia. In this respect he was mistaken; for this disposition of the cremaster muscle is one of the essential characters of the disease. Petit has not omitted to describe the relations which exist between the cremaster and the hernial sac. (*Œuvres Posthum. T.* 1, *p.* 288.) On this subject, he even relates an interesting fact, from which it results, that in certain cases, this muscle may by its contractions alone cause a reduction of the hernia. Guntz explains, with tolerable perspicuity, how the cremaster and its aponeurosis form one of the coverings of the inguinal and scrotal hernia. (*Libellus de Herniis, p.* 50.) Morgagni once saw its fleshy fibres extended over the hernial sac; (*De sed. et caus. morb. epist.* 34, *art.* 9; *epist.* 31, *art.* 15.) and Neubaver positively assures us, that he made the same remark upon the dead body of a man affected with an entero-epiplocele. (*Dissert. de Epiplooscheocele.*) After these facts, so positively and accurately observed, I cannot comprehend (says Scarpa) how in our time Pott, Richter, and several other authors, should have passed over in silence, or only mentioned vaguely, this point, so important in the history of the inguinal and scrotal hernia." (*Scarpa, Traité des Hernies, p.* 48, 50.)

When surgeons speak of a hernial sac being usually thicker and stronger, in proportion to the magnitude and duration of the hernia, their language is not at all correct; for in fact, the peritoneal investment of the hernia is seldom, or never, thus altered. I can declare (says Scarpa) after numerous observations, that in the majority of cases, the hernial sac, strictly so called, is not perceptibly thickened, and that in general it does not differ from other parts of the peritonæum, however large and old the scrotal hernia may be. (*Traité des Hernies, p.* 53.)

In a very enormous hernia, the pressure of the contents is so great, that instead of thickening the sac, it renders it thinner, and even makes it ulcerate. The protruded viscera have been met with immediately beneath the integuments, when the sac has been burst by a blow. (*Cooper; J. L. Petit.*)

The outer surface of the peritonæal part of the hernial sac, is always most closely adherent to the other more external covering by means of cellular substance. This connexion is formed so soon, after the first occurrence of a hernia, that any hopes of returning a hernial sac into the abdomen are now generally considered as chimerical. There must, however, be a certain space of time, before adhesions form, though it is, no doubt, exceedingly short.

Upon this point, Scarpa does not adopt the opinion commonly received.

There is no doubt, he observes, that in recent and small inguinal herniæ, the intestine, strangulated by the neck of the hernial sac, has been known, in more instances than one, to have been reduced by the taxis, and carried with it the whole of the sac into the abdomen. Observations, not less authentic, inform us, that after the operation for hernia, when the viscera could not be reduced on account of their adhesions to the sac, they have been seen, notwithstanding such adhesions, to get nearer to the ring daily, and at length, spontaneously to return into the belly together with the hernial sac. Louis, he thinks, was wrong in denying the possibility of these facts. (*Acad. Royale de Chir. T.* 11, *p.* 486.)

Scarpa argues, that "under certain circumstances, the cellular substance will bear, without laceration, a considerable elongation, and afterward shrink again. Thus we often see a viscus, which has suffered a considerable displacement, return spontaneously into its natural situation. In the inguinal hernia, the spermatic cord is elongated, and descends farther, than in the natural state. No laceration of the cellular substance, however, is then occasioned; for, if the hernia be kept reduced, the spermatic cord becomes shorter, daily retracts, and at last has only the same length, which it had previously to the disease. When a sarcocele becomes large and heavy, the portion of the spermatic cord naturally situated within the belly, is by degrees drawn out into the scrotum; but, after the tumour is extirpated, this portion ascends again, and of itself returns into its original situation.

"The same thing happens after the operation for the strangulated inguinal hernia. All practitioners have noticed, that the hernial sac retracts and reascends progressively towards the ring. This alone would prove, that the cellular substance, which surrounds the spermatic cord, and unites it to the hernial sac, is highly endued with the property of yielding, and afterward returning to its original state. Can the same property be refused to the cellular substance, which unites the sac to the cremaster muscle and other surrounding parts?

"While the inguinal hernia is recent, and not of much size, the cellular substance in question, possesses all its elasticity, and hence, the hernial sac and the spermatic cord, may easily ascend towards the abdominal ring. I have had occasion (says Scarpa) to make this observation upon the dead body of a man, who had an incipient inguinal hernia. The small hernial sac was capable of being pushed back into the ring with the utmost facility; and in carefully examining the parts, both within and without the belly, it appeared to me, that the cellular substance, which united the sac to the spermatic cord and cremaster muscle, was disposed to yield equally from without inwards, and in the direction precisely opposite; that is to say, it made an equal resistance to the protrusion and the reduction of the hernial sac. Monteggia has seen a case exactly similar: although, according to his own expressions, (*Instituz. Chirurg. T.* 3, *sez.* 2, *p.* 249,) the hernial sac was not very small, it adhered very loosely to the surrounding parts, and it admitted of being entirely reduced into the abdomen with great facility."

In large old scrotal herniæ, Scarpa allows, that such reduction is quite impracticable: "In these, the cellular substance, which unites the sac to the spermatic cord, and cremaster muscle, has acquired such a density, that it does not oppose less resistance to the further enlargement of the hernia, than to the efforts of the surgeon, who endeavours to effect its reduction." (*Scarpa, Traité des Hernies, p.* 57, *&c.*) Though Scarpa thus reasons about the elasticity of the cellular substance, as forming the connexion between the sac and surrounding parts, many surgeons would refer the connexion to the adhesive inflammation, and explain the diminution and shrinking of parts, after the distention and weight are removed, not by the elasticity of the cellular substance in particular, but by the same property inherent generally in the elongated parts, which elasticity, and the action of the absorbents together, produce the alteration in question.

We shall conclude this anatomical account of the inguinal hernia, with the following explanation of the parts as they appear on dissection: "the removal of the integuments exposes the exterior investment of the hernial tumour, continuous with the margins of the ring, and formed of tendinous fibres from the aponeurosis, the cremaster muscle, &c. This is connected by cellular substance with the proper hernial sac, formed of the peritonæum. This production of the peritonæum passes within the ring of the external oblique, and then goes upwards and outwards. Behind and above the ring, the inferior margin of the obliquus internus and transversalis crosses the neck of the sac. When these muscles are reflected towards the linea alba, the fascia, ascending from Poupart's ligament, and forming the upper opening of the ring, is exposed, and the epigastric artery is discovered emerging from the inner side of the neck of the hernial sac, (*Camperi Icones, Tab. X. F. M.*) which, at this precise point, becomes continuous with the peritonæum, lining the abdomen. The removal of the hernial sac will disclose the course of the spermatic cord in its descent towards the testicle; and when this is also elevated, the first part of the course of the epigastric artery, and its origin from the iliac trunk, are exposed." (*Lawrence on Hernia, p.* 182, *Edit.* 3.)

In females, the round ligament of the uterus bears the same relation to the tumour, as the spermatic cord in males. In the former subjects, bubonoceles are uncommon. Mr. Lawrence had a very rare instance pointed out to him, in which a bubonocele in a female was situated on the inner side of the epigastric artery. A still rarer case was examined by Hesselbach: it was not only an example of internal bubonocele in a woman, but of one in which the epigastric artery arose from the obturatrix artery an inch from the origin of this latter vessel from the inner side of the external iliac: the obturatrix first passed an inch obliquely downwards and inwards over the crural vein, and immediately afterward, on the horizontal ramus of the pubes, made a sudden turn backward and downward to the obturator foramen; and at this bend arose the epigastric artery, which ran transversely inward along the horizontal ramus of the pubes, behind the neck of the hernial sac, at the inner side of which it ascended to the rectus muscle, accompanied by the ligamentous remains of the umbilical arteries, which were close behind it. (*Ueber den Ursprung, &c. der Leisten und Schenkelbrüche, p.* 17.)

MARKS OF DISCRIMINATION BETWEEN OTHER DISEASES AND INGUINAL HERNIÆ.

The disorders, in which a mistake may possibly be made, are *Cirsocele, Bubo, Hydrocele,* and *Hernia Humoralis,* or *Inflamed Testicle.*

For an account of the manner of distinguishing the first complaint from a bubonocele, see *Cirsocele.*

"The circumscribed incompressible hardness, the situation of the tumour, and its being free from all connexion with the spermatic process, will sufficiently point out a bubo, at least while it is in a recent state; and when it is in any degree suppurated, he must have a very small share of the *tactus eruditus,* who cannot feel the difference between matter, and either a piece of intestine, or omentum.

"The perfect equality of the whole tumour, the freedom and smallness of the spermatic process above it, the power of feeling the spermatic vessels and the vas deferens in that process, its being void of pain upon being handled, the fluctuation of the water, the gradual formation of the swelling, its having begun below and proceeded upwards, its not being affected by any posture or action of the patient, nor increased by his coughing or sneezing, together with the absolute impossibility of feeling the testicle at the bottom of the scrotum, will always, to an intelligent person, prove the disease to be a hydrocele." Mr. Pott, however, allows that there are some exceptions, in which the testicle cannot be felt at the bottom of the scrotum in cases of hernia. "In recent bubonoceles, while the hernial sac is thin, has not been long, or very much distended, and the scrotum still preserves a regularity of figure, the testicle may almost always be easily felt at the inferior and posterior part of the tumour. But in old ruptures, which have been long down, in which the quantity of contents is large, the sac considerably thickened, and the scrotum of an irregular figure, the testicle frequently cannot be felt, neither is it in general easily felt in the *congenital hernia* for obvious reasons." (*Pott.*)

"In the *hernia humoralis,* the pain in the testicle, its enlargement, the hardened state of the epidydimis, and the exemption of the spermatic cord from all unnatural fulness, are such marks as cannot easily be mistaken; not to mention the generally preceding gonorrhœa. But, if any doubt still remains of the true nature of the disease, the progress of it from above downward, its different state and size in different postures, particularly lying and standing, together with its descent and ascent, will, if duly attended to, put it out of all doubt, that the tumour is a *true hernia.*" (*Pott.*)

When an inguinal hernia does not descend through the abdominal ring, but only into the canal for the spermatic cord, it is covered by the aponeurosis of the external oblique muscle, and the swelling is small and undefined.

Now and then, the testicle does not descend into the scrotum till a late period, and its first appearance at the ring, in order to get into its natural situation, may be mistaken for a hernia, unless the surgeon pay attention to the absence of the testicle from the scrotum, and the peculiar sensation occasioned by pressing the swelling.

POINTS OF DIFFERENCE BETWEEN THE EXTERNAL AND INTERNAL INGUINAL HERNIA, &c.

According to Hesselbach, the characteristic marks of the external bubonocele and scrotal hernia are; 1st. The direction of the tumour in the groin. 2dly. The fleshy fibres of the cremaster. 3dly. The position of the spermatic cord and testis. 4thly. The situation of the epigastric artery. 5thly. The origin of the hernia itself. 6thly. A preternatural shape of the body of the hernial sac.

1. The neck of the hernial sac, distended by the protruded viscera, raises up the front side of the inguinal canal, and superincumbent integuments, into an oblong swelling, which extends obliquely inwards and downwards towards the abdominal ring, and terminates in the tumour, formed by the body of the hernial sac. From its origin it becomes gradually more prominent and broad, and the greater the quantity of viscera protruded, and the larger the body of the sac, the more manifest is this oblique swelling, particularly when the neck of the hernia is of its natural length. In strangulated cases, the direction of the tumour is still more striking, every part of the hernial sac being then considerably distended. When the inguinal canal, and of course the neck of the hernial sac are shortened, the swelling undergoes a proportional diminution in its length; and then its resemblance to the tumour attending an internal inguinal hernia, where the opening through which the parts pass, is long and slanting, is so great, that the cases can only be discriminated by one circumstance, viz. the situation of the spermatic cord, and even this criterion is of course wanting in females. (*Hesselbach, p.* 57, 58.) Hesselbach clearly explains, that the obliquity of the swelling is seated in the neck of the hernial sac. He observes, that when an internal bubonocele in a female subject passes into the labium, the descent takes place in a very sloping direction inwards, and therefore, may at first be supposed to be an external case. But, on further examination, the oblique swelling will be found to occupy the body of the hernial sac, and to reach upwards and outwards from the labium to the abdominal ring. Now this hernia cannot be mistaken for an external bubonocele, the course of which from the ring is obliquely upwards and outwards.

Hesselbach reminds us, that an internal, inguinal, or scrotal hernia may be conjoined with an external incomplete bubonocele; a kind of case easily made out with a little attention; for the place of division between the two sacs is indicated by a more or less deep groove. The nature of the disease will also be still clearer, if one of the tumours admit of reduction. A specimen of such a double hernia is to be seen in the museum at Wurzburg.

It is further noticed by Hesselbach, that, when the situations of the external and internal herniæ are compared, the first of these swellings will be found to be rather further than the other, from the symphysis of the pubes: a difference ascribed to the effect of the internal oblique muscle, the lower fibres of which, attached to the horizontal ramus of the pubes, run in a curved direction transversely over the anterior and inner part of the neck of the hernial sac, and are applied so closely to it, that it cannot approach quite so much towards the symphysis of the pubes as the neck of the internal bubonocele does. The muscular fibres in question are situated directly behind the inner pillar of the abdominal ring.

2. Most of the fibres of the cremaster lie on the back of the neck of the sac, but others are also scattered over its external and internal sides. Some fibres may also be perceived on its forepart, which are remarkable, because they run in a transverse curved direction with their convexity downwards, and two fasciculi of which descend below the abdominal ring. These are the fibres of the cremaster, which proceed within the ring transversely upwards over the spermatic cord, and are pushed out of that opening by the hernial sac. These arched fleshy fibres are not always, though generally, perceptible; and, when they are present on the forepart of the hernial sac, Hesselbach accounts them a sure criterion of an external scrotal hernia; but, he has not yet ascertained, whether they are visible, while the rupture is confined to the groin.

3. The situation of the spermatic cord and testis in the external inguinal hernia, and,

4. That of the epigastric artery, and its displacement inwards by the neck of the sac, have been sufficiently explained.

5. With respect to the mode, in which the hernia originates, the disease often takes place suddenly, without any exciting cause being observed, capable of accounting for the effect. Here, says Hesselbach, the predisposing cause must have been great; for instance, the communication between the cavity of the peritonæum and that of the tunica vaginalis has remained a long while unclosed; and, when a hernia of this description is examined, the other marks of an external inguinal hernia are associated with the sudden formation of the disease. In this quick manner, the congenital hernia, which is one of the external cases, frequently arises. The internal inguinal hernia is also observed mostly to take place very suddenly, yet only after violent occasional causes.

6. A preternatural form of the body of the hernial sac, Hesselbach remarks, is particularly seated in the sheath of the spermatic cord, and can never happen in the internal scrotal hernia; for, it is only in external cases, that the above sheath is ever converted into the hernial sac. Hesselbach here refers to the partial contraction, often noticed at the lower part of the above sheath in cases of congenital hernia; a circumstance, which is always discovered previously to the business of dividing the ring.

In adults, an external inguinal, or scrotal hernia, on the right side, contains some of the ileum, and, when the swelling is large, it may include the cœcum, and sometimes a piece of omentum. In one child, ten weeks old, and in another still younger, the appendix vermiformis was protruded and connected by a natural band to the posterior side of the peritonæum. When, in these ruptures of the right side, the cœcum, or, in those of the left, the colon are met with closely adherent to the hinder side of the hernial sac, the adhesion is not to be looked upon as the effect of disease, since it is the perfectly natural connexion of those bowels with the peritonæum. On the left side, the parts most commonly protruded are the colon and omentum.

With regard to the *internal inguinal hernia*, the place of its first protrusion has been already described. The protruded peritonæum and viscera, according to Hesselbach's account, *pass from behind straight forwards*, between the fibres of what he names the internal inguinal ligament, and the fleshy fibres of the internal oblique muscle: they then pass, at the inner side of the spermatic cord, out of the abdominal ring, where the hernia presents *a circular globular swelling, suddenly formed in consequence of some violent effort*. The neck of the hernial sac is very short; shorter than it can ever be in an external inguinal hernia, and, when the tumour is of the above shape, the passage through which it passes is annular, narrower in some instances than others, and its margin is tendinous. From the few cases, which Hesselbach has seen of this form of the disease, he is led to conjecture, that the hernial sac is rarely so large as in the external inguinal hernia. (*P.* 41.) The earlier dissections made by Hesselbach, led him to suppose, that, in the internal inguinal hernia, the opening, through which the protrusion happens, is always annular, and the swelling in front of the ring globular; but subsequent cases, which he has met with, have informed him, that the opening is frequently sloping and longish, in which circumstance, the resemblance of the tumour to that of the external bubonocele with a shortened neck, is such, that the only mark of distinction between the two cases is the position of the spermatic cord. In females, even this criterion is of course deficient. (*Hesselbach, p.* 57.) Though individuals of almost every age are subject to internal bubonoceles, they are much less common than external cases. According to Hesselbach, they may be known by the following characters. 1. The swelling, formed by the body of the hernial sac, immediately in front of the abdominal ring. 2. The situation of the spermatic cord. 3. That of the epigastric artery.

1. The neck of the hernial sac, besides being very short, does not, like that of an external inguinal hernia, take an oblique direction, but advances straight from behind forwards through the abdominal ring, and as the body of the sac lies directly over the neck, none of the swelling, formed by the distention of the latter part, can be felt. Nor does any other tumour, produced by the body a hernial sac, ever cause a circular spherical swelling directly before the abdominal ring. The situation of the neck of this kind of hernia must already apprise us, that the internal bubonocele is nearer, than the external, to the symphysis of the pubes. In women, the shape of the tumour is the only character, by which the case can be distinguished. (*Hesselbach, p.* 43.)

2. After what has been already stated, respecting the situation of the spermatic cord in the internal inguinal hernia, I shall merely notice one or two observations of Hesselbach. The cord lies either upon the outer side, or outer half of the forepart of the upper portion of the hernial sac, the blood-vessels forwards, and the vas deferens backwards. When the sac is adherent to the whole length of the cord, the testis is not situated under the fundus of the sac, as in the external scrotal hernia, but either at the forepart or outer side of the body of the sac. The hernial sac, as far as the abdominal ring, is excluded from the common peritonæal covering of the spermatic cord, but at this opening, it descends between the cord and the internal thin part of the sheath of the cremaster, which, however, is somewhat stronger towards the front and outer side of the hernia, over which part alone the fleshy fibres of the cremaster are spread. (*P.* 44.)

3. The epigastric artery always ascends obliquely inwards at the outer side of the neck of the hernial sac. Hesselbach has never seen but one case of internal bubonocele, in which there was a deviation from this rule. The example has been already mentioned, and was one in the epigastric artery, arose from the obturatrix about an inch from the origin of this last vessel. The viscera, usually contained in an internal inguinal, or scrotal hernia, on the right side, are the lower part of the small intestines, and sometimes omentum; on the left, a part of the small intestines, frequently omentum, and when the tumour is large, the colon may also protrude. A protrusion of the bladder may accompany the disease, but that organ is of course always excluded from the cavity of the hernial sac. When the remains of the umbilical cord are situated more outward than usual, and lie over the centre of the space, at which the protrusion happens, an internal bubonocele may be double, the prolapsus happening on each side of that ligamentous substance, which is itself also pushed outwards. In consequence of the accidental presence of some very strong tendinous fibres at the centre of the fascia, called by Hesselbach the internal inguinal ligament, there may also be two distinct protrusions, with separate hernial sacs. (*P.* 46.)

When the surgeon, by a due consideration of the foregoing circumstances, has formed a judgment respecting the nature of the hernia, he will be better qualified to regulate the treatment of the case. Thus, in the external inguinal hernia, he will know, that the pressure, employed for the reduction of the bowels, should be made in the direction of the neck of the hernial sac, viz. obliquely upwards and outwards, towards the anterior superior spinous process of the ilium; but that, when the neck of the same kind of hernia is very short, and the posterior side of the inguinal canal has been removed, the pressure should be made nearly in a straight line from before backwards. For what Hesselbach terms the long-necked external inguinal hernia, the pad of a truss should be so constructed, as not merely to press upon the abdominal ring, but also upon the neck of the sac and the inner opening of the inguinal canal. But, when the neck of the hernia is very short, the pad should be nearly of the same form, as that required for an internal inguinal hernia. (*Hesselbach, p.* 38; *and Brunninghausen, Gemeinnützіger Unterricht überdie Bruche, &c. Wurzb.* 1811.) In attempting the reduction of an internal inguinal hernia, the pressure should be directed nearly straight backwards; and the pad of the truss should only act upon the abdominal ring. (*Hesselbach, p.* 46.)

THE OPERATION FOR STRANGULATED INGUINAL HERNIA, OR BUBONOCELE

Consists in dividing the integuments; dissecting down to the sac, and opening it; removing the stricture; and replacing the protruded viscera.

The external incision should begin an inch above the external angle of the ring, and extend over the middle of the tumour to its lower part. The advantage of beginning the wound so high, is to obtain convenient room for the incision of the stricture. By this first cut, the external pudic branch of the femoral artery may be divided; it crosses the hernial sac near the abdominal ring, and sometimes bleeds so freely, as to require to be immediately tied. In general, however, a ligature is unnecessary.

When this incision is carried low down, the caution, given by Camper, should always be remembered, viz. that there is a possibility of dividing the spermatic vessels, should they happen to be situated, as they sometimes are, in front of the hernia. And, in order to avoid such an accident, which is particularly apt to occur in cases of internal inguinal, or scrotal hernia, the incision through the skin should be made obliquely downwards and inwards. (*Hesselbach, p.* 46.) The division of the integuments brings into view the fascia, which is sent off from the tendon of the external oblique muscle, and covers the hernial sac.

The layers of tendinous fibres, cellular substance, &c. intervening between the skin and sac, should be carefully divided, one after another, with the knife and dissecting forceps, the edge of the former instrument being turned horizontally, lest the incisions be carried too deeply at once, and the viscera contained in the sac wounded.

After making a small opening through a part of the fascia covering the sac, some practitioners introduce a director, and divide this fascia upward and downward as far as the tumour extends. The same manner they next pursue with regard to the cremaster muscle. Thus the sac becomes completely exposed. When this method is followed, Mr. A. Cooper advises the incisions not to be carried upward, nearer than one inch, to the abdominal ring, for reasons which will be presently explained.

However, it may be rationally doubted, whether there is any good in these formal and successive divisions of the whole length of the coverings of the sac; and it is certain, that they protract the operation very much; for the manner in which the sac adheres to the outer investment of it, prevents the latter from being raised and cut without trouble and delay. As the grand object, after the skin has been divided, is to make a small opening into the sac, sufficient for the introduction of a director, dissecting down at one particular place answers every purpose, and enables us, in the end, to lay open the whole of the sac and its coverings in the shortest time. Let the operator only take care to raise the successive layers of fibres with the forceps, and divide the apex of each elevated portion with the knife held horizontally. As there is commonly a quantity of fluid in the sac, and it gravitates to the lower part, to which place the intestine seldom quite descends; this is certainly the safest situation for making the first opening into the sac. The operator, however, should not rely upon the presence of such fluid, and cut too boldly; for sometimes it is absent, and the viscera may be in immediate contact with, nay, adherent to, the inner surface of the sac.

The circular arrangement of the vessels of a piece of intestine, and its smooth polished surface, sufficiently distinguish it from the hernial sac, which has a rough cellular surface, and is always connected with the surrounding parts, although these adhesions, in a very recent case, may be but slight. (*Lawrence on Ruptures, p.* 214, *Edit.* 3.)

I have mentioned, that Mr. A. Cooper only advises cutting the fascia, and other coverings of the sac, under the skin, to within an inch of the abdominal ring; and, of course, he also recommends limiting the division of the sac itself to the same extent. His reasons for this practice, are to avoid making the closure of the wound more difficult, and to lessen the danger of peritonæal inflammation.

Having laid open the hernial sac with a probe-pointed bistoury, guided by a director, or the fore-finger introduced into the opening, made at the lower part of the sac, the next desideratum is to divide the stricture, unless the viscera admit of being easily reduced, without such an incision being made as occasionally happens.

From the anatomical account, which has been given of the bubonocele, it appears, that the stricture may either be situated at the abdominal ring, and be formed by the margins of this opening, or else at the inner aperture of the canal, about one inch and a half, in a direction upward and outward, from the outer opening in the tendon of the external oblique muscle. This latter strangulation is caused by the semicircular edge of the transversalis muscle and its tendon, which pass over the neck of the hernial sac, and by a fascia, arising from Poupart's ligament, the semicircular border of which passes under this part of the sac.

The common, and probably the best practice is to divide the hernial sac, together with the stricture. When this is situated at the abdominal ring, the surgeon is to introduce the end of a director a little way into the neck of the sac, within the aperture in the tendon, and with a probe-pointed bistoury, guided on the latter instrument, *he is to cut the stricture upward and outward, or else directly upward;* a manner, which Mr. A. Cooper recommends, because it is applicable to all cases, even the less frequent ones, in which the hernia protrudes at the inner side of the epigastric artery; and, in all common instances, we know, that this vessel runs upward round the inner side of the neck of the sac; a course prohibiting the division of the stricture upward and inward.

In the external inguinal hernia, the method of cutting the stricture upward and outward is perfectly safe; but when the case is what Hesselbach calls internal, and the viscera descend on the inner side of the epigastric artery; it is a plan which would endanger the latter vessel, and ought never to be adopted, notwithstanding any statement made in its favour by Rudtorffer. *Abhandlung über die einfachste und sicherste operations-Methode eingesperrter Leisten-und-Schenkelbrüche. Wien.* 1808.) In this work the erroneous plan of cutting the ring inwards is inculcated, both in the external and internal inguinal rapture. The author, however, seems to have performed many operations in this manner, without any accident from hemorrhage; a piece of good fortune, which Professor Langenbeck ascribes to the circumstance of the knife having always been applied, as Rudtorffer directs, to the middle of the inner pillar of the ring, and to the cut having been very limited. Langenbeck is of opinion, that, if the knife had been applied a little lower, and the incision carried to any extent, the epigastric artery, in ordinary cases, would not have escaped injury. Mr. A. Cooper's rule of always cutting in one direction, viz. upward, which I believe was first advised by Autenrieth, *Dissert. Moment. circa Herniotom. præcipue circa evitandam art. epigastr. læsionem, Tub.* 1799) is perhaps a very good one, because it is at least easy for the memory, and will answer very well even when it is not in the power of the surgeon to pronounce positively whether the case is a short-necked external bubonocele, or an internal one with an oblong oval fissure, cases having a great external resemblance, especially in women, in whom there is not the spermatic cord as a criterion; for, after all, this part, when present, is the surest guide, and that on which Desault founded his perfectly safe advice, viz. when the cord is at the posterior or inner side of the neck of the hernial sack, to divide the ring upwards and outwards, but inwards and upwards when it lay at the outer or on the forepart of the sac. (*Œuvres Chir. de Bichat, T.* 2.) At least, this advice is subject but to one exception, which is the very rare one of the epigastric running round the inner side of the neck of the sac in an internal bubonocele; a possibility which has been already explained, and which leads Hesselbach particularly to recommend the division of the ring in every internal inguinal hernia, to be made straight upwards. (*P.* 47.) Indeed, the long-necked external bubonocele is the only case in which he thinks the latter plan should give way to that of cutting upwards and outwards. The safety and propriety of the method of always cutting upward, are strikingly illustrated by what Scarpa observes: he states, that the right direction of the incision of the ring is directly upwards, parallel to the linea alba. "I have (says he) operated in the way which I recommend upon several dead subjects, who had either external or internal inguinal herniæ, directing my incision in the course of a line drawn from the upper part of the ring parallel to the linea alba; in all, I constantly left the epigastric artery untouched, even when I extended the cut about an inch above the inguinal ring." (*Scarpa, Traité Pratique des Hernies, p.* 111.) Only one objection, as far as I know, has been made to this plan, and it is founded on the alleged impossibility of introducing the knife, so as to cut straight upwards, when the neck of the hernial sac is long, because then the posterior side of the inguinal canal is in the way. (*Hesselbach, p.* 40.) No more of the parts forming the stricture, should be cut than is just sufficient for allowing the protruded viscera to be reduced without bruising or otherwise hurting them; and I consider the middle of the upper margin of the ring the safest place for making the necessary incision.

Mr. A. Cooper, in his valuable work on the Inguinal Hernia, advises a mode of dividing the stricture, considerably different from the usual method. He directs the finger of the operator to be introduced into the sac, (which, in his plan, we know is left undivided for the space of one inch below the ring.) When the stricture is felt, a probe-pointed bistoury is to be conveyed over the front of the sac into the ring (between the two parts,) and the latter only is then to be divided, in the direction upward, opposite the middle of the neck of the sack, and to an extent just sufficient to allow the protruded parts to be returned into the abdomen without their being hurt. The two chief advantages which Mr. A. Cooper imputes to this method, are, that the danger of peritonæal inflammation will be less, and that the epigastric artery, if wounded, would not bleed into the abdomen. I am of opinion, that Mr. Lawrence's remarks, concerning this proposal, are judicious: "An accurate comparative trial of both methods would be necessary, in order to determine the weight of the first reason. The second circumstance cannot be a matter of any importance, if we cut in such a direction as to avoid the risk of wounding the artery. Many circumstances present themselves as objections to this proposal. The manœuvre itself, although perhaps easy to the experienced hand of such an able anatomist as Mr. C., would, I am convinced, be found highly difficult, if not impracticable, by the generality of surgeons. This difficulty arises from the firm manner in which the sac and surrounding parts are connected, we might almost say consolidated, together. The experience of of Richter (*Traité des Hernies, p.* 118) shows, that this objection is founded in reality. He once tried to divide the ring, without cutting the sac, but he found it impracticable. If the stricture is so tight as to prevent the introduction of the finger, there must be great danger of wounding the protruded parts. The practice would still be not adviseable, even if it could be rendered as easy as the common method of operating. Mr. C. leaves an inch of the sac, below the ring, undivided; thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished. It would be better to follow the advice of Richter, and scarify the neck of the sac, in order to promote an adhesion of its sides. He has found this practice so successful in accomplishing a radical cure, that he advises (*p.* 191.) its employment in every operation for strangulated hernia." (See *Lawrence on Ruptures, p.* 321, *Edit.* 3.)

If the stricture should be at the inner opening of the canal for the spermatic cord, Mr. A. Cooper advises the operator to introduce his finger into the sac, as far as the stricture, and then to insinuate a probe-pointed bistoury, with the flat part of its blade turned towards the finger, between the front of the sac and the abdominal ring, till it arrives under the stricture, formed by the lower edge of the transversalis and obliquus internus. Then the edge of the instrument is to be turned forward, and the stricture cut in the direction upward. This plan of not cutting the neck of the sac, is liable to all the objections stated by Mr. Lawrence, in regard to the case in which the strangulation takes place at the abdominal ring. Mr. A. Cooper's bistoury is a very proper one for dividing the stricture, as it only has a cutting edge to a certain distance from the point. Perhaps, on the whole, we may infer, that it is both most easy and advantageous to divide the neck of the sac, together with the stricture, whether this be situated at the ring, or more inward. The method of cutting the stricture from without inwards I consider objectionable, on the ground of the risk of wounding the bowels in this mode, being greater, than that of any accident wounding the epigastric artery, when it arises in an unusual manner, and deviates from its regular course; a reflection, which has made Dr. Hesselbach, junior, an advocate for the practice. (See *Sicherste Art des Bruchschnittes, 4to. Bamberg*. 1819.)

Room being made for the reduction of the protruded parts into the abdomen, by the division of the stricture, they are immediately to be returned, if sound, and free from adhesions. This object is considerably facilitated by bending the thigh. The intestines are to be reduced before the omentum, but when a portion of mesentery is protruded, it is to be returned before either of the preceding parts. The intestine should always be reduced, unless it be found in a state of actual mortification. It often appears so altered in colour, that an uninformed person would deem it improper to return it into the abdomen. However, if such alteration should not amount to a real mortification, experience justifies the reduction of the part. Mr. A. Cooper has judiciously cautioned the operator not to mistake the dark chocolate brown discolorations, for a state of gangrene. With these the protruded part is frequently found affected; and as they generally produce no permanent mischief, they ought to be carefully discriminated from the black-purple, or lead-coloured spots which usually precede mortification. To determine whether a discoloured portion of intestine be positively mortified, some recommend pressing forward the blood contained in the veins, and if they fill again, it is looked upon as a proof that the bowel is still possessed of life.

In returning a piece of intestine into the abdomen, the surgeon should first introduce the part nearest the ring into this aperture, and hold it there until another portion has succeeded it. This method is to be continued till the whole of the protruded bowel is reduced.

Writers on surgery cannot too severely reprobate the employment of any force, or violence, in the endeavours to return the contents of a hernia in the operation: a method the more pernicious, because such parts are more or less in a state of inflammation. It is always better to enlarge the stricture, than pinch and bruise the bowel in trying to get it through an opening, which is too small. Distention of the intestine sometimes prevents the reduction: but when this is the only impediment, the part may generally be returned, as soon as its contents have been compressed into the intestinal canal within the stricture. It is better, however, to dilate the strangulation a little more, than use any force in trying to get the intestine back into the abdomen in the manner just suggested.

Reduction is sometimes impeded by the protruded parts adhering to each other, or to the hernial sac. The intestines are not often found very firmly adherent together. The omentum and inside of the sac are the parts which are most subject to become intimately connected by adhesions. The fingers will commonly serve for breaking any recent slight adhesions which may have taken place between the intestines and inside of the hernial sac. When those adhesions are firm, and of long standing, they must be cautiously divided with the knife; an object which can be most easily and safely accomplished, in case they are long enough to permit the intestine to be elevated a little way from the surface of the sac.

But, provided their firmness and shortness keep the external coat of the bowel and inner surface of the sac in close contact, the greatest care is requisite in separating the parts with a knife, so as to avoid wounding the intestine. In doing this, the most prudent and safe method is not to cut too near the bowel, but rather to remove the adherent parts of the sac, and return them with the intestine into the abdomen. Every preternatural connexion should always be separated, before the viscera are reduced: Mr. A. Cooper mentions, that a fatal obstruction to the passage of the intestinal matter has arisen from the mere adhesion of the two sides of a fold of intestine together. (*P.* 31.) When the adhesions, which prevent reduction, are situated about the neck of the sac, and out of the operator's view, it is best to make the wound through the skin and abdominal ring somewhat larger, so as to be able to separate the adhesions with more safety.

Having reduced the parts, the operator should introduce his finger, for the purpose of being sure that they are fairly and freely returned into the abdomen, and no longer suffer constriction, either from the inner opening, from the ring, or the parts just within the cavity of the peritonæum.

TREATMENT OF THE OMENTUM.

In an entero-epiplocele, this part, if healthy and free from gangrene, is to be reduced after the intestine. When, however, it is much diseased, thickened, and indurated, as it frequently is found to be, after remaining any considerable time in a hernial sac, the morbid part should be cut off. Its reduction, in this circumstance, would be highly improper, both because an immoderate enlargement of the wound would be necessary, in order to be able to put the diseased mass back into the abdomen, and because, when reduced, it would, in all probability, excite inflammation of the surrounding parts, and bring on dangerous symptoms. (See *Hey, p.* 172.)

The diseased omentum should always be cut off with a knife; and if any of its arteries should bleed, they ought to be taken up with a tenaculum, and tied separately with a small ligature. An unreasonable apprehension of hemorrhage from the cut end of the omentum has led many operators to put a ligature all round this part, just above the diseased portion which they were about to remove. This practice cannot be reprobated in terms too severe; for a frequent effect of it is to bring on a fatal inflammation, and even mortification of the omentum, extending within the abdomen, as high as the stomach and transverse arch of the colon. Mr. A. Cooper has remarked with great truth, that it is surprising this custom should ever have prevailed. The very object of the operation is to extricate the omentum from its strangulated state, arising from the pressure of the surrounding tendon, and no sooner has this been done, than the surgeon includes it in a ligature, which produces a more perfect constriction, than that which existed before the operation was undertaken.

"When the omentum has suffered strangulation for a few days (says Mr. Lawrence) it often becomes of a dark red, or livid colour; and there is an appearance, on cutting it, as if some blood were extravasated in its substance. This, I believe, is the state which surgeons have generally described under the term of gangrene." (*P.* 262.)

When cut in this state, it does not bleed. I need hardly observe, that the dead part must be amputated, and never reduced. Some have advised leaving the omentum in the wound, especially in cases of old herniæ, in which it has been a long while protruded. Hey mentions cases, showing that granulations form very well, and that the wound becomes firmly healed, when this plan is followed. (*P.* 180, *&c.*) Every one, however, will acknowledge the truth of what Mr. Lawrence says on this subject. The method "is attended with no particular advantage, but certainly exposes the patient to the possibility of ill consequences. The omentum, left in the wound, must be liable to injury, inflammation, or disease; and hence arises a source of danger to the patient. Unnatural adhesions, formed by this part, have greatly impaired the functions of the stomach. Cases are recorded, where the unfortunate patient has never been able to take more than a certain quantity of food, without bringing on instant vomiting; and even where it has been necessary for all the meals to be taken in the recumbent position, with the trunk curved, and the thighs bent. (*Gunz.*) To avoid the possibility of such afflicting consequences, we should, after removing any diseased portion, carefully replace the sound part of the omentum in the abdominal cavity." (See *Lawrence on Ruptures, p.* 274, *Edit.* 3.)

TREATMENT, WHEN THE INTESTINE IN THE SAC IS MORTIFIED.

Sometimes, on opening the hernial sac, the intestine is found to be in a gangrenous state, although the occurrence could not be previously known, owing to the integuments and the hernial sac itself not being affected with the same mischief. In ordinary cases, however, both the skin and sac become gangrenous at the same time with the contents of the hernia. The tumour, which was previously tense and elastic, becomes soft, doughy, emphysematous, and of a purple colour. Sometimes the parts also now spontaneously return; but the patient only survives a few hours.

Mr. A. Cooper has accurately remarked, that in other instances, the skin covering the swelling, sloughs to a considerable extent, the intestine gives way, and as the feces find vent at the wound, the symptoms of strangulation soon subside. When the patient continues to live in these circumstances, the living part of the intestine becomes adherent to the hernial sac, the sloughs separate and come away, and thus an artificial anus is established, through which the feces are sometimes discharged during the remainder of life. (See *Anus, Artificial.*)

Frequently, however, things take a more prosperous course; the feces gradually resume their former route to the rectum, and in proportion as the artificial anus becomes unnecessary, it is shut up. Many instances of this sort have fallen under my own observation in St. Bartholomew's Hospital.

The chance of a favourable event is much greater in some kinds of hernia, than in others. When the strangulation only includes a part of the diameter of the gut, the feces are sometimes only partially discharged through the mortified opening. This quantity lessens as the wound heals, and the patient gets perfectly well. (*Louis, Mem. de l'Acad. de Chir. T.* 3. *P. S. Palm, De Epiplo-enterocele crurali incarcerata sphacelata, cum deperditione notabili substantiæ intestini, sponte separati, feliciter curata alvo naturali restituta,* 4*to. Tub.* 1748. *Haller, Disp. Chir.* 3, 2.) A small gangrenous spot, or two, may end in the same manner. Mortification, as well as wounds of the large intestines, is much more frequently followed by a recovery, than the same affection and similar injuries of the small intestines. Mortification of the cœcum and its appendix, in a hernial sac, has happened several times, without materially disturbing the usual course of the feces to the anus, and the patients very soon recovered. (*Med. Obs. and Inq. Vol.* 3. *p.* 162; *Hey's Pract. Obs. p.* 162, *&c.*)

The grand thing, on which the establishment of the continuous state of the intestinal canal depends, in all these cases, is the adhesion which the living portion of the bowel, adjoining the mortified part, contracts with the peritonæum all round. In this manner, the escape of the contents of the bowels into the cavity of the peritonæum becomes in general completely prevented. The two ends of the sound portion of intestine, after the mortified part has separated, open into a membranous cavity, which previously constituted a portion of the peritonæal sac, and now unites the extremities of the gut. The gradual contraction of the wound closes the membranous cavity externally, and thus the continuity of the canal is restored. The two ends, however, are not joined so as to form a continued cylindrical tube, like that of the natural gut; but they are united at an angle more or less acute, and the matter, which goes from one to the other describes a half circle in a newly formed membranous cavity that completes the canal; a subject which has been more fully explained in another part of this work. (See *Anus, Artificial.*)

It is an observation of Mr. A. Cooper's, that the degree of danger, attending an artificial anus, depends on the vicinity of the sphacelated part of the intestinal canal to the stomach. Thus, if the opening be in the jejunum, there is such a small extent of surface for absorption, between it and the stomach, that the patient dies of inanition.

Let us now suppose, that the mortified state of the intestine has only been discovered, after laying open the hernial sac in the operation. The mischief may only consist of one or more spots; or of the whole diameter of the protruded bowel. In the first case, the proper practice is to divide the stricture, and return the intestine into the abdomen, with the mortified spots towards the wound. Mild purgatives and clysters are then to be exhibited. The most favourable mode, in which a case of this kind ends, is when the intestinal matter gradually resumes its natural course, after being either partly or entirely discharged from the wound. But sometimes the patient sinks under the disease, or an artificial anus continues for life.

The repeated observations of modern surgeons have now decided, that no ligature, passed through the mesentery, to keep the gangrenous part of the bowel near the wound, is at all necessary. The parts, in the neighbourhood of the ring, have all become adherent together, in consequence of inflammation, at the same time that the parts in the hernial sac mortify; and of course, the partially gangrenous bowel, when reduced, is mechanically hindered, by these adhesions, from slipping far from the wound. Desault and De la Faye, both confirm the fact, that the intestine never recedes far from the ring; and even were it to do so, the adhesions, which it soon contracts to the adjacent surfaces, would, as Petit has explained, completely circumscribe any matter which might be effused, and hinder it from being extensively extravasated among the convolutions of the viscera. (*Mem. de l'Acad. de Chir. T.* 1, 2.)

Where the chief part, or the whole of the diameter of the protruded bowel is mortified, the first and most urgent indication is to relieve the bad symptoms arising from the distention of the intestinal canal above the stricture. "Let a free incision (says Mr. Lawrence) be made through the mortified part of the gut, in order to procure that evacuation of the loaded canal, which nature attempts by the process of gangrene." If the intestine has already given way, a free division of the integuments and sac allows the exit of the accumulated matter; and the opening in the gut may be enlarged, if necessary. (*Lawrence on Ruptures, p.* 283.)

Here the division of the stricture is unnecessary, since all the mischief, which the bowel can receive from it, is done. This subject is well explained by Mr. Travers. (See *Inq. into the Process of Nature in Repairing Injuries of the Intestines, &c. p.* 300, *&c.*) Mild purgatives and clysters will be proper to unload the bowels, and determine the course of the feces towards the anus. Should, however, the stricture appear after the mortification, to impede the free escape of the intestinal contents, a moderate dilatation of it must undoubtedly be proper.

Mr. Lawrence, in his valuable Treatise on Ruptures, has clearly exposed the impropriety of sewing the ends of the intestinal canal together, introducing one within the other, supported by a cylinder of isinglass, &c. put in their cavity, in those cases, in which the whole circle of the intestine has mortified, and been cut away, as was advised by former writers. By drawing the intestine out of the cavity, in order to remove the dead part, the adhesion behind the ring, on which the prospect of a cure chiefly depends, must be entirely destroyed; and new irritation and inflammation must be unavoidably produced, by handling and sewing an inflamed part. (See *Lawrence on Ruptures, p.* 298, *&c.*)

Instead of such practice, this gentleman judiciously recommends dilating the stricture, and leaving the subsequent progress of the cure entirely to nature. The sloughs will be cast off, and the ends of the gut are retained by the adhesive process in a state of apposition to each other, the most favourable for their union. Thus, there is a chance of the continuity of the intestinal canal becoming established again.

Whatever experiments it may be allowable to make in wounds with protrusion and division of the bowels, nothing, I think, is now more completely established, than the absurdity and danger of attempting to stitch the bowels in cases of hernia.

OPERATION FOR VERY LARGE INGUINAL HERNIÆ.

When the tumour is of long standing, exceedingly large, perhaps extending half way down to the knees, and its contents have never admitted of being completely reduced, the indication is to divide the stricture, provided a strangulation takes place; but without laying open the hernial sac, or attempting to reduce the parts.

The reasons against the common plan of operating, under such circumstances, are, the difficulty of separating all the old adhesions; the hazardous inflammation, which would be excited by laying open so vast a tumour, and the probability that parts so long protruded, might even bring on serious complaints, if reduced. J. L. Petit, and afterward Dr. Monro, advised the sac not to be opened. (See *Mal. Chir. T. 2, p.* 372. *Description of Bursæ Mucosæ*, 1788.)

OPERATION WHEN THE HERNIA IS SO SMALL THAT IT DOES NOT PROTRUDE EXTERNALLY THROUGH THE RING.

In this kind of case, there is little appearance of external tumour; consequently, the disease is very apt to be overlooked by the patient and surgeon, and some other cause assigned for the series of symptons. The manner of operating, in this form of the disease, differs from that in the common scrotal hernia; the incision is to be made parallel to the direction of the spermatic cord, and the stricture will be found at the internal ring. (*A. Cooper on Inguinal Hernia.*)

TREATMENT AFTER THE OPERATION.

Evacuations from the bowels should be immediately promoted by means of clysters, oleum ricini, or small doses of any of the common salts, dissolved in peppermint water. For some time, the patient must only be allowed a low diet. When symptoms of inflammation of the bowels and peritonæum threaten the patient, general bleeding, leeches applied to the abdomen, fomentations, the warm bath, blisters, doses of the oleum ricini, and clysters, are the means deserving of most dependence, and should be resorted to without the least delay. When all danger of peritonæal inflammation is past, and the patient is very low and weak, bark, wine, cordials, and a generous diet, must be directed. The effervescing saline draught, with opium, is the best medicine for quieting sickness, after the operation. Opium and cordials are the most eligible for checking diarrhœa. As the operation does not usually prevent the parts from becoming protruded again, a truss must be applied before the patient leaves his bed, and afterward constantly worn.

PROPOSALS FOR THE RADICAL CURE OF THE BUBONOCELE,

Of castrating the patient, applying caustic, or of the operation of the punctum aureum, with this view, I need only say, that they are barbarous, and not at all adapted for the attainment of the desired end. A description of these methods may be found in Paré, Wiseman, &c.

The old operation, termed the *royal stitch*, was one of the most promising plans. It consisted in putting a ligature under the neck of the hernial sac, close to the abdominal ring, and then tying that part of the sac, so as to render it impervious, by the adhesive inflammation thus excited.

The royal stitch, performed in this manner, has been actually attended with success. (*Heister, Vol.* 2.) The umbilical rupture was cured by Saviard, on similar principles; and Desault radically cured nine cases of the exomphalos in children, by tying the hernial sac.

Schmucker cured two irreducible ruptures, free from strangulation, by cutting away the body of the sac, after tying its neck. (*Chir. Wahrnehmungen, B.* 2.) In one case, Mr. A. Cooper found cutting away the sac, alone insufficient.

Dissecting away the whole hernial sac, or even laying it open, must be a formidable operation, compared with merely making a small incision down to the neck of the sac, and applying one ligature. If the hernia were reducible, and the upper part of the sac could be rendered impervious by the ligature, all other more severe plans would be superfluous. However, Petit, Sharp, Acrel, &c. record cases, which tend to prove the danger and inefficacy of the royal stitch; though it is true, that none of these surgeons operated exactly in the simple manner above suggested.

Richter recommends scarifying the neck of the sac, with the view of producing an adhesion of its sides to each other; a plan, which, he says, he found very successful.

From the account, however, which has been given of the anatomy of the bubonocele, it is obvious, that none of these methods could do more than obliterate the sac as high as the ring, and never that portion of it, which is within the inguinal canal. Hence, the neck of the sac must still remain open for the descent of the viscera. This consideration, and that of the chances of bad and fatal symptoms from any operation undertaken solely for this purpose, and not urgently required for the relief of strangulation, are the grounds on which these experiments are now disapproved.

CRURAL, OR FEMORAL HERNIA.

Verheyen, who wrote in 1710, first demonstrated the distinct formation of crural hernia, which until then had been generally confounded with bubonocele.

The parts, composing this kind of hernia, always protrude under Poupart's ligament, and the swelling is situated towards the inner part of the bend of the thigh. The rupture descends on the inside of the femoral artery and vein, between these vessels and the os pubis, through the *crural ring*, or *canal* for the transmission of the same vessels. And, as Hesselbach has remarked, the inner opening of this ring or canal is the predisposing cause of the disease, the peritonæum spread over it, being gradually propelled into it by various occasional causes, so as to complete the tendency to hernia. The actual protrusion of the bowels may be formed either suddenly, or by degrees. As soon as the bowels have once passed the outer aperture, or what Cloquet terms more properly the lower opening of the crural canal, the hernia has more room for extending itself forwards, and to each side, and the integuments now become elevated into *an oval swelling, the long diameter of which is nearly transverse.* (*Hesselbach, p.* 47.) Gimbernat names the passage through which the femoral hernia protrudes from the abdomen, the *crural ;* Hey the *femoral ring;* and Cloquet, the *crural canal.*

Females are particularly subject to this kind of rupture. It has been computed, that nineteen out of twenty married women, afflicted with hernia, have this kind; but, that not one out of an hundred unmarried females, or out of the same number of men, have this form of the disease. (*Arnaud.*)

"The crural hernia," says Scarpa, is frequently observed in women who have had several children; it very seldom afflicts young girls; and still more rarely men. In the latter, the viscera can more easily escape through the inguinal ring, by following the spermatic cord, than they can descend along the crural vessels, and raise the margin of the aponeurosis of the external oblique muscle, that forms the crural arch. In women, an opposite disposition prevails, in consequence of the smallness of the inguinal ring, which, in them, only gives passage to the round ligament of the uterus, and besides, is situated lower down, and nearer the pubes, than it is in men, whilst on the contrary, the crural arch is more extensive, by reason of the wider form of the pelvis. Morgagni expressly says, that he never met with the crural hernia in the dead body of any male subject. *Mihi, ut verum fatear, nondum nisi in fœminis accidit ut eam viderem.* (*De sed. et caus. morb. Epist.* 34, 15.) Camper gives us to understand almost the same thing. (*Icones Herniarum, in Præfat.*) Hévin often operated for this kind of hernia in females, but only once in the male subject. (*Pathol. et Therap. p.* 406.) Sandifort and Walter have both seen but a single instance of it in the dead body of the male subject. (*Obs. Anat. Pathol. cap.* 4, *p.* 72. *Sylloge comment. anat. p.* 24, *obs.* 21.) Arnaud himself, to whom modern surgery is highly indebted for many important precepts on the operation for the strangulated crural hernia in both sexes, candidly confesses, that he never had an opportunity of dissecting a hernia of this kind in the male subject." (*Scarpa, Traité des Hernies, p.* 201.)

Scarpa had at his disposal a male subject, in which there was a crural hernia, and he availed himself of the opportunity of examining the parts with the utmost care. He first injected the blood-vessels; he afterward attentively dissected all the parts concerned in the disease; and he has published an exact description of the particulars, illustrated by an engraving.

According to Hesselbach, the femoral hernia, though not common in men, is more frequent than is generally believed, and often overlooked on account of its being very small. (*Ueber den Ursprung, &c. der Leisten-und-Schenkelbrüche, p.* 47.) Thus, in an example published in a modern work, an inguinal and femoral hernia were met with together in a gentleman, sixty-three years of age. On examination of the body after death, a small piece of intestine, forming a crural hernia, was found strangulated, and concealed under an inguinal rupture and a mass of fat. (*C. Bell's Surgical Obs. Vol.* 1, *p.* 187.)

According to the observations of Scarpa, and all the best modern writers upon surgery, the crural hernia forms, both in the male and female subject, in the cellular substance, which accompanies the crural vessels below Poupart's ligament. The swelling follows the internal side of those vessels, and gradually descends into the fold of the thigh, between the sartorius, gracilis, and pectineus muscles. "Many surgeons believe (says Scarpa,) that the hernial sac, and the intestines, which it contains, are ordinarily situated above the crural vessels and trunk of the vena saphena, and sometimes between these vessels and the anterior superior spine of the ileum. But as far as my knowledge extends, this assertion is not supported by a single accurate description of the crural hernia in the early stage. It is true, that when the tumour has in time acquired a large size, and its fundus is inclined in a parallel manner to the fold of the thigh, it partly or entirely covers the crural vessels, and even the crural nerve, as Walter says he once observed. (*Sylloge comment. anat. p.* 24.) But it is not thence to be concluded, that the tumour in the beginning descended over the crural vessels, much less betwixt them and the anterior superior spinous process of the ileum. Neither must it be imagined, that the neck of the hernial sac becomes removed from the inner to the outer side of these vessels. If these two cases ever happen, they must be very rare; and the best authors who have treated of crural hernia, concur in stating, that in performing the operation, they have constantly found the viscera situated on the inside of the crural vessels, but never on their outside. Even when the tumour, after acquiring a considerable size, is situated transversely over the crural vessels, the neck of the hernial sac has always been found upon their inner side, that is to say, between them and the pubes. Le Dran, (*Observ. de Chir. T.* 2, *p.* 2.) La Faye, (*Cours d'Opérations de Dionis, p.* 358.) Petit, (*Œuvres Posthumes, T.* 2, *p.* 219.) Morgagni, (*De Sed. et Caus. Morb. epist.* 34, 15.) Arnaud, (*Mem. de Chir. Tom.* 2, *p.* 768.) Gunz, (*De Herniis libellus, p.* 78.) Bertrandi, (*Trattato delle Operazoni, T.* 1, *annot. p.* 218.) Pott, (*Chirurg. Works, Vol.* 2, *p.* 152.) Desault, (*Traité des Mal. Chirurg. p.* 191, 195.) B. Bell, (*A System of Surgery, Vol.* 1, *p.* 387.) Richter, (*Traité des Hernies, chap.* 34.) Nessi, (*Institus. Chir. T.* 2, *p.* 198.) Lassus, (*Med. Oper. T.* 1, *p.* 198.) and many other writers, all concur upon this point. In support of their opinion, (says Scarpa,) I could cite a great number of cases of my own, which I have collected either in operating on several individuals for crural hernia, or in dissecting the same kind of hernia in the bodies of many female subjects, and in that of the man, from whom I have taken the 8th plate. Lastly, also, having had an opportunity of dissecting in a female an enormous crural hernia, which descended one-third of the way down the thigh, I observed that the neck of the sac did not encroach at all upon the crural vessels, but lay entirely on their inner side." (*Scarpa, Traité des Hernies, p.* 203, 206.)

The tumour, on account of its situation, is liable to be mistaken for an enlarged inguinal gland; and many fatal events are recorded to have happened from the surgeon's ignorance of the existence of the disease. Mr. Lawrence once saw an hospital surgeon mistake a crural hernia for a glandular tumour, and the patient died, without any attempt being made to afford relief by the operation. (*P.* 391. See also *Petit, Traité des Mal. Chir. T.* 2, *p.* 293, *&c.*) A gland can only become enlarged by the gradual effects of inflammation; the swelling of a crural hernia comes on in a momentary and sudden manner, and when strangulated, occasions the train of symptoms already described in our account of the inguinal hernia, which symptoms an enlarged gland could never occasion. Such circumstances seem to be sufficiently discriminative; though the feel of the two kinds of swelling, is often not of itself enough to make the surgeon decided in his opinion. It is particularly remarked by Hesselbach, that, while a femoral hernia is incomplete, that is to say, within the outer opening of the passage, through which the parts descend, the disease presents itself as a round firm swelling, on the outer side of which the femoral artery can be felt pulsating: this small hernia may be mistaken for an inflamed gland, and the case can only be discriminated by the history of its origin and symptoms. (*Ueber den Ursprung der Leisten-und-Schenkelbrüche, p.* 51.) A femoral hernia may be mistaken for a bubonocele, when the expanded part of the swelling lies over Poupart's ligament. As the taxis and operation for the first case ought to be done differently from those for the latter, the error may lead to very bad consequences. *The femoral hernia, however, may always be discriminated, by the neck of the tumour having Poupart's ligament above it. In the bubonocele, the spine of the pubes is behind and below this part of the sac; but in the femoral hernia, it is on the same horizontal level, and a little on the inside of it.* (See *Lawrence on Ruptures, p.* 392, 393, *Ed.* 3.)

In the male subject, "the crural hernia, in the early stage, (says Scarpa) is situated so deeply in the bend of the thigh, that it is difficult, even in the thinnest persons, to feel its neck, and in examining its circumference with the extremity of the finger, the tendinous margin of the opening, through which the parts are protruded, can only be perceived with considerable difficulty. On the contrary, the inguinal hernia, however small it may be, is always less deeply situated; it is about half an inch above the bend of the thigh. In carrying the finger round its neck, the tendinous margin of the inguinal ring can be easily felt at its circumference; and at the posterior part of the small tumour, the cord composed of the spermatic vessels is distinguishable. *When the crural hernia has acquired a considerable size, its neck is always deeply situated in the bend of the thigh; but its body and fundus assume an oval form, and their great diameter is situated transversely in the bend of the thigh.* Whatever may be the size of the inguinal hernia, it always presents a tumour of a pyramidal form, the base or fundus of which, far from being directed towards the ileum, follows exactly the direction of the spermatic cord, and descends directly into the scrotum. Besides the symptoms, common to all hernial swellings, the crural hernia, when it has attained a certain size, presents some others which are peculiar to it, such as *a sense of stupor and heaviness in the thigh*, and *œdema of the leg, and even of the foot*, of the same side." The reason, why œdema and numbness of the limb, are particularly remarkable in cases of femoral hernia, is justly referred by Hesselbach, to the circumstance of the femoral vessels and nerves, with numerous lymphatics, taking their course through the crural ring, and according to his observations, the numbness and œdema are especially great, when the protrusion is omentum, which makes stronger pressure on the vessels and nerves, than commonly happens in a case of enterocele. (*P.* 53.)

"In women, however, as Scarpa observes, it is less easy to distinguish the crural hernia from the inguinal. In fact, the absence of the spermatic cord, and the nearer situation of the ring to the crural arch, may easily occasion a mistake. Sometimes, a woman may even be supposed to have a double crural hernia of the same side, whilst, of these two distinct, though neighbouring herniæ, one may be inguinal, and the other crural. Arnaud (*Mém. de Chir. T.* 2. *p.* 605,) relates an instance of such a mistake." (*Scarpa, Traité des Hernies, p.* 207, 208.)

This interesting writer takes occasion to observe further, upon this part of the subject, that the portion of the inferior pillar of the abdominal ring, which separates this opening from the internal and inferior angle of the crural arch, is so slender in women, that it is sometimes hard to distinguish the crural from the inguinal hernia, which is not the case in male patients.

Until a few years ago, the stricture, in cases of femoral hernia, was always supposed to be produced by the lower border of the external oblique muscle, or, as it is termed, Poupart's ligament. A total change of opinion on this subject, however, has latterly taken place, in consequence of the observations first made by Gimbernat, in 1768. "In the crural hernia, (says he) the aperture through which the parts issue, is *not* formed by two bands, (as in the inguinal hernia) but it is a foramen almost round, proceeding from the internal margin of the crural arch (Poupart's ligament,) near its insertion into the branch of the os pubis, between this bone and the iliac vein; so that, in this hernia, the branch of the os pubis is situated more internally than the intestine, and a little behind; the vein, externally, and behind; and the internal border of the arch, before. Now it is this border which always forms the strangulation." (See *A new Method of Operating for the Femoral Hernia, by Don Antonio de Gimbernat, p.* 6, *Trans. by Beddoes.*)

The utility of knowing, that it is not Poupart's ligament which produces the strangulation, in cases of femoral hernia, is important; for we then know, that cutting the lower and outer border of the external oblique muscle, is quite erroneous. This proceeding is the more to be reprobated, because the lower pillar of the abdominal ring, in both sexes, will be divided by directing the incision upward, or upward and inward; and thus the abdominal and crural rings will be made into one common aperture, large enough to make the future occurrence of hernia very likely to happen. In the male, there is also considerable danger of the spermatic cord being cut. Cutting Poupart's ligament obliquely outwards, is attended with still more danger; for the epigastric artery will infallibly be divided at its origin; and with all these hazards, the incision must be quite useless, unless carried on to the internal edge of the crural arch. (*Gimbernat, p.* 16.)

The inclination, however, of several modern writers to refer the strangulation entirely to Gimbernat's ligament, is not sanctioned by the most careful observers, like Hesselbach and Langenbeck, (*Neue Bibl. B.* 2. *p.* 132.) The former justly remarks, that a complete femoral hernia may be strangulated in two places, either at the outer or inner opening of the passage, through which the protrusion happens. Nay, says he, that the strangulation is sometimes caused by the outer opening, was known to former surgeons, for they remarked, that the constriction was removed by dividing the fascia. (*P.* 53.) And, in addition to these two modes of strangulation, is to be enumerated a third, in which the viscera are constricted by protruding through some weaker point, or accidental opening, in the anterior parietes of the crural canal (*Hesselbach, p.* 48; *also Langenbeck, Op. cit. p.* 132,) or even through an aperture in the inner side of this passage, as we find depicted in the twentieth plate of Langenbeck's treatise, "De Structurâ Peritonæi."

I know of no surgical writer, who has given a clearer account of the anatomy of the femoral hernia, than Langenbeck (*Neue Bibl. B.* 2, *p.* 112, *&c.*) He observes, that when the dissection is begun at the inside of the inguinal region, the following circumstances are noticed: after the removal of the peritonæum from the abdominal muscles, and from the psoas, iliacus internus, and the great vessels, the inner surface of the transversalis still has an investment, which Cloquet terms the *fascia transversalis*, and which is always a white glistening aponeurosis. From the place, where the femoral artery lies under Poupart's ligament, to the anterior superior spine of the ilium, the preceding fascia is extended in a strong fibrous form behind the inner surface of Poupart's ligament, and a thin continuation of it is extended over the iliacus internus and psoas muscles, where it is named by Mr. A. Cooper and Cloquet the *fascia iliaca*. The fascia of the transverse muscle closes the belly behind Poupart's ligament, as completely as the peritonæum does, so that between the femoral artery and the anterior superior spine of the ilium none of the bowels can protrude, which occurrence is still further prevented by the fascia lata, which below Poupart's ligament is closely attached to the muscles of the thigh. By the pelvis being thus shut up, the origin of a crural hernia on the outside of the femoral vessels is rendered quite impossible. (*Langenbeck, op. cit.*) This part of the explanation very nearly resembles that delivered by Mr. A. Cooper, except that the latter describes the iliac fascia, and not what Cloquet calls the transverse fascia, as closing the pelvis from the spine of the ilium to the crural vessels. But, this difference is easily accounted for by the circumstance of Mr. A. Cooper extending the name fascia iliaca beyond the limits given it by Cloquet and Langenbeck.

Near the anterior superior spinous process of the ilium, Langenbeck remarks that the fascia of the transverse muscle has some strong fibres, which proceed inwards under the internal opening of the inguinal canal, of which they form, as it were, the bottom, and are named by Hesselbach the *internal inguinal ligament*. They go over the femoral artery and vein, are connected above with the fascia of the transverse muscle, and below are continued into the fascia of the psoas and iliac muscles. Where these fibres pass over the femoral vessels, they expand into a firm aponeurosis, which passing downwards, is intimately attached at the inner side of the femoral vein to the horizontal branch of the os pubis, close to the symphysis, and then joins the aponeurosis of the recti muscles. The expanded portion of the foregoing tendinous fibres, thus continued along the crista of the os pubis to the sheath of the rectus, forms the inner surface of *Gimbernat's*, or the *femoral* or *crural ligament*. The inner edge of this ligament is falciform, and concave, the concavity being turned towards the femoral vein. Now where the fascia of the transverse muscle extends downwards, on the outer side of the crural artery, to the fascia of the psoas and iliac muscles, so as to close the pelvis between that vessel, and the anterior superior spinous process of the ilium, it also forms, like Gimbernat's ligament, a falciform edge, the concavity of which lies close over the external convexity of the crural artery. Thus, partly by the concave edge of Gimbernat's ligament, directed towards the crural vein, and partly by the concave edge of the extension of the fascia of the transverse muscle to the fascia iliaca, which edge is turned towards the crural artery, an aperture is produced, through which the femoral vessels pass out of the pelvis. This opening is named by Cloquet the *upper opening of the crural canal*, or as many English surgeons would say, of the *crural* or *femoral ring*. By Hesselbach, it is called the *internal opening for the femoral vessels.* However, as these vessels do not lie loosely and unconnectedly in this aperture, the opening itself is shut up, as it were, and cannot be seen without dissection.

On the above described fasciæ, there is a considerable quantity of cellular substance, which covers the vessels in the pelvis, forms a sort of sheath for the crural artery and vein, and accompanies these vessels through the inner opening of the crural canal, or ring, which is itself accurately shut up by it. When this cellular substance is removed, the white glistening fasciæ are plainly seen passing through the same opening, and coming nearer together in a funnel-like manner. Where the fascia of the transverse muscle forms the outer falciform edge of this aperture, and is passing over the arteria circumflexa ilii to the psoas and iliac muscles, it sends off through the opening a process, which becomes connected with the outer side of the crural canal, or ring: while from the internal inguinal ligament, which lies above this opening, and constitutes the upper edge of the inner aperture of the crural canal, a production is sent, which is connected with the anterior side of this canal. As for the posterior and inner sides, they have a connexion with the fasciæ of the psoas and levator ani.

When the groin is externally dissected, in order to have a view of the crural ring or canal, on the outside of the pelvis, the following appearances present themselves: after the removal of the common integuments, one finds below Poupart's ligament, a quantity of fat, glands, lymphatics, veins, and arteries, which vessels come out through small openings in the fascia lata. As soon as the outer surface of the external oblique muscle is cleared, its aponeurosis is found to become stronger at the anterior superior spinous process of the ilium, and its fibres to collect together, and assume the form of a band, which is Poupart's ligament, called by Hesselbach the *external inguinal ligament*, and by Gimbernat, Cloquet, and others, the *crural arch.* This ligament, as is well known, passes obliquely inwards and downwards towards the os pubis, and after forming the external pillar of the abdominal ring, is first closely inserted into the angle or tubercle of the os pubis, and then being continued inwards, or backwards, in the form of a firm fascia, is attached to the horizontal ramus of that bone, making the *anterior or outer surface of Gimbernat's, or the femoral, ligament*, which is consequently produced by the junction of Poupart's with Hesselbach's internal inguinal ligament along the spine of the os pubis. Thus, just as the internal inguinal ligament is a strengthened part of the fascia of the transverse muscle, the outer inguinal ligament, (or, as it is here commonly called) Poupart's ligament, is produced by the strengthened fibres of the lower portion of the aponeurosis of the external oblique muscle, the fibres of it making the external pillar of the ring, being continued further towards the symphysis of the pubes, in the form of the outer surface of Gimbernat's ligament. (*Langenbeck, Neue Bibl. B.* 2, *p.* 120, 121.) English surgeons make the formation of Gimbernat's, or the femoral ligament more simple: thus Mr. Lawrence states, that when Poupart's ligament approaches the pubes, "it becomes suddenly broader; that it is fixed by this broad portion, along the whole length of the angle and crista of the pubes; that it has a rounded and strong anterior edge, a thin and sharp posterior margin; and that the former of these is nearer to the surface, while the latter is comparatively deeply seated. The breadth of this part varies, in different subjects: it is generally from three quarters of an inch to an inch. Sometimes, as Gimbernat has stated, it measures more than an inch. Dr. Monro has observed, that it is broader in the male than in the female subject; and from this structure, he explains in part the more rare occurrence of this rupture in the male." (*P.* 368, *Ed.* 3.)

The fascia lata, which is spread over the muscles of the thigh, is only a continuation of the aponeurosis of the external oblique muscle, and, as it proceeds downwards from Poupart's ligament, is very closely attached to the muscles of the thigh, all the way from the anterior superior spinous process of the ilium, to the femoral artery, drawing as it were Poupart's ligament downwards and inwards, or backwards, towards the cavity of the pelvis, so as to give to its external edge a convex appearance, and shut up the outside of the pelvis, from the anterior superior spine of the ilium as far as the crural nerve and artery, so firmly, that the formation of a femoral hernia at this part is impossible. And, if small apertures, filled with fat, be discernible in this portion of the fascia lata, still no hernia can here take place, because, as Langenbeck has already explained, here the interior of the pelvis is again shut up by fasciæ already described.

Under the fascia lata are situated the anterior crural nerve, the vein and artery. The vena saphena magna lies on the outside of it, and passes through an opening in it into the femoral vein. This aperture in the fascia lata is at the inner side of the groin, opposite the internal opening of the crural ring, or canal. It is named by Hesselbach *the external aperture for the femoral vessels*, and described by him as an oblique fissure about fifteen lines in length. He takes notice of its external semilunar edge, and two horns, which are directed inwards; the parts first particularly described by Mr. A. Burns of Glasgow, under the name of the *semilunar*, or *falciform process of the fascia lata.*

The lower horn bends rather inwards and upwards, and terminates in the production of the fascia lata spread over the pectinalis muscle. The upper horn, which is less curved, buries itself under the external pillar of the abdominal ring. Over the lower horn of the opening, just now described, the vena saphena magna ascends into the femoral vein. Through the same aperture also pass nearly all the superficial lymphatics of the lower extremity. According to Cloquet, the fascia lata consists of two layers, of which the anterior superficial one is closely attached to the crural arch, extends over the femoral vessels, and forms the anterior side of the crural canal. The other layer, near the pubes, quits the former, and, covering the pectinalis muscle, constitutes the hinder side of that canal. The anterior layer of the fascia then forms an oval aperture, through which the vena saphena passes, and which is considered by Cloquet as *the lower opening of the crural canal*. This opening, called by Hesselbach *the external foramen for the femoral vessels*, is well delineated both in his excellent work, and in the twenty-third plate of Langenbeck's book (*De Structura Peritonæi, testiculorum tunicis, &c.* 8vo. *Gött.* 1817.) According to the investigations of the last anatomist, as soon as the integuments are removed, this opening in the fascia lata, with its external semilunar edge, and two horns, are regularly seen. The front side of the crural canal is formed by the fascia lata. Where this fascia proceeds in the form of Hesselbach's upper horn under and behind the external pillar of the abdominal ring, and makes the outer layer of Gimbernat's ligament, it is continued as a thin aponeurosis over the vena saphena, so that it makes not merely the upper horn, but reaches further downwards, and forms the outer side of the crural canal. The outer side then of the crural canal, or ring, according to Langenbeck, extends from the outer semilunar edge of the external opening for the femoral vessels, or, as English surgeons would say, from the edge of the *falciform process of the fascia lata*. The larger the preceding thin continuation of fascia is, the smaller is the external opening for the femoral vessels, the more is the upper horn bent downwards, and the more determinate is the form of the canal. (*Langenbeck, Neue Bibl. B.* 2. *p.* 124, 125.)

According to Mr. Lawrence, "the fascia lata, or fascia of the thigh, has two distinct insertions at the upper and anterior part of the limb. It is attached to the front edge of the pubes, over the origin of the pectineus, the fibres of which it closely covers, and it is also fixed to the front of the crural arch. The former of these is continuous, behind the femoral vessels, with the iliac fascia: the latter is not inserted along the whole length of the tendon, its attachment ceasing on the inner side of the vessels, which it covers anteriorly. Here, therefore, the femoral artery and vein are interposed between the two divisions." (*On Ruptures, Edit.* 3, *p.* 371.)

Where the insertion of the fascia lata into Poupart's ligament ends, it forms what Mr. Burns of Glasgow calls the *falciform process*, the upper part of which is attached to the above ligament, while the lower proceeds further down the thigh. The concavity of the falciform process is directed towards the pubes. This anatomical connexion is one chief cause, why extending the thigh, and rotating it outward, render the crural arch tense.

The hernia, being situated in front of the pectineus, must of course be exterior to the fascia lata. In my opinion, surgeons are very much indebted to Mr. Lawrence for his able explanation of this fact. As for myself, I am candid enough to own that, until I read his clear and concise account of the anatomy of the crural hernia, I could never reap any accurate notions, concerning the relative situations of the hernial sac and fascia of the thigh, from other more prolix works, with the exception of those of Hesselbach and Langenbeck, by whom the anatomy is made perfectly intelligible. Mr. Lawrence reminds us, however, that the particular crural hernia, contained in the sheath of the femoral vessels, lies under the fascia; *p.* 382, *Edit.* 3. And he mentions, that "the falciform process of the fascia lata, passes along the upper and outer part of the tumour. The iliac vein is placed on the outer side of the neck of the sac; the pubes is directly behind it; and the upper and inner parts are bounded by the thin posterior edge of Poupart's ligament.

The inner side of the crural ring or canal, as already explained, is connected with the fascia of the transverse muscle. And, according to Langenbeck, below the part of the fascia lata, which forms the external foramen for the femoral vessels, the front side of the crural canal is sometimes formed by a continuation of the fascia of the transverse muscle, as he found was the case in both groins of one female subject. In such a case, there is a good deal of fat between the fascia lata, and the aponeurosis of the transverse muscle, and the two parts are easily separable. Langenbeck admits, however, that the same appearance may arise from a splitting of the layers of the fascia lata. Frequently the front side of crural ring is so short, that the opening cannot rightly be termed a canal, and it is always shorter than the posterior side. When the outer side exits, it is extended across the inner over the space between the two horns, and is then connected with the aponeurosis of the pectinalis derived from the fascia of the psoas and levator ani muscles. In the anterior and inner sides of the crural canal, there are some small openings. Doubtless, this stricture is referred to by Hesselbach, when he says, that, in the male subject the outer opening for the femoral vessels is further closed by a net-like web of tendinous fasciculi. The posterior side of the crural canal, or ring, is entirely formed by the part of the fascia of the psoas, which enters its inner opening, and joins the aponeurosis of the pectinalis muscle. The outer side of the canal lies under the fascia lata, and joins the anterior and posterior sides, where the aponeuroses of the transverse and iliac muscles proceed to the outside of the femoral artery. Langenbeck thinks the opening, by which the vena saphena passes over the lower horn of the falciform process of the fascia lata, might be named *the lower aperture of the crural canal.* (See *Langenbeck's Neue Bibl. für die Chirurgie, B.* 2, *p.* 126, 127, *8vo. Hanover,* 1819.)

According to Hesselbach, in femoral hernia, the two openings of the passage now termed the crural or femoral ring, are one half larger than natural. The outer portion of the inner of these apertures is propelled more outward, and with it the epigastric artery. The femoral vein no longer lies at the external end of this opening, but rather at the back of the canal or passage. The external semilunar edge (the falciform process) of the outer opening, is carried more outward and upward, and is tightly applied over the distended hernial sac. In this state of the parts, the outer opening forms an oval firm tendinous ring, the direction of which, like that of the inner opening for the passage of the femoral vessels, is transverse. The neck of the hernial sac is that portion of it, which lies within the canal between the two openings. The posterior side of this canal, or passage, now frequently named the crural, or femoral ring, is longer than the anterior. In one large hernia, Hesselbach found it an inch and a half in length, but the anterior side of the passage more than one-third shorter. The greatest diameter of the inner opening was one inch five lines, while that of the outer one was only one inch four lines. Most of the posterior part of the neck of the hernial sac, with the hinder side of the canal, lies upon the pectineus muscle, and towards the outer side upon the femoral vein. The neck of the hernial sac adheres more firmly to the anterior, than to the posterior side of the passage. At the outer opening of the passage, the neck terminates at almost a right angle forwards in the body of the sac, the upper portion of which lies upon Poupart's ligament, but the largest part of it is situated on the deep-seated layer of the femoral fascia, by which the outer side of the body of the sac, as high as the neck, is separated from the crural vessels and nerves. In the male subject, when the tendinous fibres, mixed with the cellular substance covering the outer opening of the passage, make great resistance at particular points, the hernial sac of a femoral hernia may be double, or even divided into several pouches, a preparation exhibiting which occurrence is in the anatomical museum at Wurzburgh. (*Hesselbach, p.* 48.) Except in a few cases, in which the origin and course of the epigastric artery are unusual, this vessel runs very close to the external side of the neck of the hernial sac, much nearer than it does in an internal bubonocele.

The sac of the femoral hernia is exceedingly narrow at its neck; and, where its body begins, it becomes expanded in a globular form; the sac of the bubonocele is generally of an oblong pyramidal shape. The body of the sac of the femoral hernia, makes a right angle with the neck, by being thrown forward and upward, a circumstance very necessary to be known in trying to reduce the parts by the taxis. Though the tumour, formed by the body of the sac, is oval and nearly transverse, it is found, when attentively examined, to take the direction of the groin, which extends obliquely downwards and inwards, the outer, rather smaller end of the swelling being somewhat higher than the inner. (*Hesselbach, p.* 50.)

The sac of the femoral hernia is said by Mr. A. Cooper to be immediately covered by a kind of membranous expansion, consisting of condensed cellular substance, and named by him, the *fascia propria.* According to the same gentleman, a weak aponeurosis derived from the superficial fascia of the bend of the thigh, also covers the swelling, and is described as lying immediately beneath the skin and adipose substance. Under this fascia is the condensed cellular substance, or fascia propria, then some adipose substance, and lastly the true peritonæal sac itself. It is of infinite use to remember these circumstances in operating, lest one should think the hernial sac divided when it is not so.

All late writers on hernia, have remarked how very small the aperture is, through which the viscera protrude in the femoral rupture; how much greater the constriction generally is, than in the bubonocele; consequently, how much more rapid the symptoms are; how much less frequently the taxis succeeds; and how much more dangerous delay proves. (See *A. Cooper, Hey, Lawrence, &c.*)

Though the crural ring is almost always small, yet in a few instances, in which the tumour is large, and of long standing, it becomes very capacious, just as the opening often becomes, through which the inguinal hernia protrudes. Dr. Thomson, of Edinburgh, Mr. Hey, and Mr. Lawrence, have related examples of this kind.

The remarks already made, concerning the treatment of hernia, before having recourse to the knife, are all applicable to the present case, and need not be repeated. In attempting to reduce the femoral hernia by the taxis, the surgeon should recollect, however, that relaxing Poupart's ligament, and the femoral fascia, is of the highest consequence. Hence, the thigh should be bent, and rolled inwards. The pressure ought also to be first made downwards and backwards, in order to push the swelling off Poupart's ligament; and afterward, the parts should be propelled upwards, so that they may return through the crural ring.

OPERATION FOR THE FEMORAL, OR CRURAL HERNIA.

Mr. A. Cooper says, "the incision of the integuments is to be begun an inch and a half above the crural arch, in a line with the middle of the tumour, and extended downwards to the centre of the tumour below the arch. A second incision, nearly at right angles with the other, is next made, beginning from the middle of the inner side of the tumour, and extending it across to the outer side, so that the form of this double incision will be that of the letter T reversed." The angular flaps are, of course, to be next dissected off, and reflected.

The making of two incisions, however, is not deemed necessary by the majority of surgeons; and, in all the numerous operations which I saw performed in St. Bartholomew's Hospital, during a space of nearly fifteen years, a transverse wound was not found necessary. The division of the skin should begin about an inch above the crural ring, and be continued obliquely downwards and outwards. In this manner, we cut exactly over the place, where the incision of the stricture should be made.

"The first incision (says Mr. A. Cooper) exposes the superficial fascia, which is given off by the external oblique muscle, and which covers the anterior part of the hernial sac; but, if the patient is thin, and the hernia has not been long formed, this fascia escapes observation, as it is then slight and delicate, and adheres closely to the inner side of the skin. When this fascia is divided, the tumour is so far exposed, that the circumscribed form of the hernia may be distinctly seen; and a person not well acquainted with the anatomy of the parts, would readily suppose that the sac itself was now laid bare. This, however, is not the case, for it is still enveloped by a membrane, which is the fascia, that the hernial sac pushes before it, as it passes through the inner side of the crural sheath. This membrane, the fascia propria, is to be next divided longitudinally from the neck to the fundus of the sac; and if the subject is fat, an adipose membrane lies between it and the sac, from which it may be distinguished, by seeing the cellular membrane passing from its inner side to the surface of the sac.

"This is, in my opinion, the most difficult part of the operation; for the fascia propria is very liable to be mistaken for the sac itself; so that when it is divided, it is supposed that the sac is exposed, and the intestine is laid bare; following upon this idea, the stricture is divided in the outer part of the sac, and the intestine, still strangulated, is pushed, with the unopened sac, into the cavity of the abdomen.

"The hernial sac being exposed, is to be next opened; and, to divide it with safety, it is best to pinch up a small part of it between the finger and thumb; to move the thumb upon the finger, by which the intestine is distinctly felt, and may be separated from the inner side of the sac; and then to cut into the sac, by placing the blade of the knife horizontally. Into this opening, a director should be passed, and the sac opened from its fundus to the crural sheath. (*On Crural and Umbilical Hernia.*)

Sometimes the contents of the hernia, thus exposed, admit of being returned, without the further use of the knife. When this object, however, cannot be readily done, the protruded parts should never suffer injury from repeated manual attempts; and it is safest to divide the stricture at once.

The merit of having first proposed the safest plan of cutting Poupart's ligament, even before surgeons were aware of the parts which really form the strangulation, is assigned by Gimbernat to Mr. B. Bell, who introduced his finger below Poupart's ligament, between the ligament and the intestine, (an evident proof, says Gimbernat, that there was no strangulation there;) he then made a very superficial incision from above downwards, into the thickest part of the ligament to its lower edge; and, without cutting quite through it, he continued his incision about an inch. He rested the back of the scalpel upon his finger, which served as a guide to the instrument, and, at the same time, as a defence to the intestine. The incision, however, having been continued for an inch, would, as Gimbernat remarks, inevitably cut the internal edge of the crural arch. Now, cutting this, only for a few lines, gives sufficient room for the easy reduction of the parts, and there is no necessity to touch the ligament, as it never occasions the strangulation.—(*Gimbernat, p.* 27.)

Gimbernat's method of dividing the stricture, in cases of femoral herniæ, is now frequently regarded as the safest and most effectual. "Introduce, along the internal side of the intestine, a cannulated or grooved sound, with a blunt end, and a channel of sufficient depth. This is to be directed obliquely inwards, till it enter the crural ring, which will be known by the increased resistance; as also when its point rests upon the branch of the os pubis. Then suspend the introduction; and keeping the sound (with your left hand, if you are operating on the right side, and v. v.) firmly resting upon the branch of the os pubis, so that its back shall be turned towards the intestine, and its canal to the symphysis pubis, introduce gently with your other hand, into the groove of the sound, a bistoury, with a narrow blade and blunt end, till it enter the ring. Its entry will be known, as before, by a little increase of resistance. Cautiously press the bistoury to the end of the canal: and employing your two hands at once, carry both instruments close along the branch to the body of the pubis, drawing them out at the same time. By this easy operation, you will divide the internal edge of the crural arch at its extremity, and within four or five lines of its duplicature; the remainder continuing firmly attached, by the inferior band, or pillar, of which it is the continuation. This simple incision being thus made, without the smallest danger, the internal border of the arch, which forms the strangulation, will be considerably relaxed, and the parts will be reduced with the greatest ease." (*Gimbernat, p.* 45, 46.)

Mr. A. Cooper recommends the stricture to be divided "obliquely inwards and upwards, at right angles to the crural arch."

After advising us to open the sac of a femoral hernia, with particular care, on account of its being much thinner than that of a bubonocele, and (as might be added) on account of its seldom containing any fluid, and often having no omentum in it covering the intestine, Mr. Hey remarks, "The stricture made upon the prolapsed parts is very great, as I have already observed; but if the tip of the finger can be introduced within the femoral ring, to guide the bubonocele knife, a small incision (for the ring is narrow) will be sufficient to set the parts at liberty. If the tip of the finger cannot be introduced at the proper place, a director with a deep groove must be used instead of the finger; but I prefer the latter. The finger, or director, should not be introduced very near the great vessels; but on that side of the intestine or omentum which is nearest to the symphysis of the ossa pubis. *The incision may then be made directly upwards.* The surgeon must take especial care to introduce his finger or director within that part where he finds the stricture to be the greatest, which, in this species of hernia, is the most interior part of the wound." (*P.* 155.)

Gimbernat's mode is preferable to Mr. Hey's, because, were the operation done on a male, cutting directly upward would endanger the spermatic cord.

Mr. Lawrence has noticed, that "an incision of the most interior part of the stricture is free from all danger, in the ordinary course of the vessels. But that variety, in which the obturatrix artery, arising from the epigastric, runs along the inner margin of the sac, seems to preclude us from cutting even in this direction. Hesselbach met with a remarkable instance of such irregularity in the origin and course of the obturatrix artery in the body of a female, in whom there were two small crural herniæ. On the right side, the epigastric and obturatrix arteries arose, by a common trunk, from the crural artery below Poupart's ligament. They soon separated from one another; the epigastric taking its ordinary course upwards at the outer side of the neck of the hernial sac, while the obturatrix made a considerable turn, and ran transversely inwards over the strong fibres of the femoral ligament, and encircled the anterior and inner side of the neck of the hernia, whence it afterward proceeded obliquely downwards and outwards, behind the horizontal branch of the os pubis, towards the obturator foramen. (*Hesselbach, p.* 52.) A mode of operating has been lately proposed, (*Edinb. Med. and Surg. Journal, Vol.* 2, 205.) with a view of avoiding this danger. We are directed to make an incision through the aponeurosis of the external oblique muscle, just above the crural arch, and in a direction parallel to that part: to introduce a director under the stricture from this opening, and to divide the tendon to the requisite extent, by means of a curved knife passed along the groove. (*Treatise on Ruptures, Edit.* 3, *p.* 407.) For reasons which Mr. Lawrence states, this plan is certainly not altogether eligible, and, upon the whole, Gimbernat's method of cutting the stricture is the safest. Monro computes that the obturator artery may arise from the epigastric, once in twenty-five or thirty subjects. But, allowing that it originates more frequently, it then does not always deviate from its usual course along the outside of the sac. Mr. A. Cooper says: "in all cases, which I have myself dissected, where this variety existed with crural hernia, the obturator has passed into the pelvis, on the outer side of the neck of the sac, entirely out of the reach of any danger of the knife." (*On Crural Hernia, p.* 21.) Mr. Lawrence concludes, that the comparative number of instances, in which it is found on the opposite side, cannot be more than one in twenty, and consequently if we admit, that the obturatrix artery arises from the epigastric once in five times, it would only be liable to be wounded once in a hundred operations. (*P.* 412, *Edit.* 3.)

When the origin and course of the epigastric artery differ from what is common, this vessel, as Hesselbach remarks, sometimes passes inwards along the horizontal branch of the os pubis, ere it ascends towards the rectus muscle; and when this variation exists in a case of femoral hernia, the artery does not pass over the outer side of the neck of the sac, but first under it, and then round its inner side. Hesselbach has seen only one instance of this irregularity of the epigastric artery in a female, and never in a male subject. (*Ueber den Ursprung, &c. der Leisten-und Schenkelbrüche, p.* 52.)

The industrious Cloquet examined 250 bodies, for the purpose of estimating the average number of cases, in which the origin and course of the obturatrix artery are different from what is most common. He found, that when this artery and the epigastric arise by one common trunk, they sometimes separate from each other above, and rarely below the upper opening of the crural canal. In the first case, the longer their common trunk is, the closer do they lie to Gimbernat's ligament, and to the inner edge of the upper opening of the above canal. In the second case, the common trunk of these arteries arises within this canal, and the two vessels then return into the abdomen. In 160 bodies, of which 87 were male, and 73 female, the obturatrix artery arose on both sides from the hypogastric, and only in 56, of which 21 were male, and 35 female, did it originate on both sides from the epigastric. In 28, of which 15 were male, and 13 female, the obturatrix arose on one side from the hypogastric, and on the other from the epigastric. In 6 bodies, viz. 2 male, and 4 female, it originated from the crural. (See *Recherches Anat. sur les Hernies, 4to. Paris.*)

It is observed by Professor Scarpa, that "the round ligament of the uterus, in passing through the abdominal muscles, follows precisely the same track as the spermatic cord. It is equally situated behind Poupart's ligament, with the difference, that it does not become so distinct from the internal extremity of this ligament, as the spermatic cord does, because it has not so far to run, in order to get from that ligament to the inguinal ring, the latter opening being situated lower in the female, than the male subject. The round ligament, like the spermatic cord, also crosses the epigastric artery, before reaching the inguinal ring. And as the crural hernia always begins at the internal and inferior angle of the arch of this name, as well in the male as the female, it follows, that, in the two sexes, the epigastric artery remains in its natural situation, and invariably corresponds to the external side of the neck of the crural hernia; whilst the spermatic cord, in men, and the round ligament, in women, pass over the extremity of the front of the neck of the hernial sac. In the operation for the crural hernia, in females, the incision of the neck of the hernial sac, and crural arch, when directed upward towards the linea alba, cannot wound the epigastric artery, which it is of the most consequence to avoid; but it always divides, either totally or partially, the round ligament of the uterus, which cannot lead to any dangerous hemorrhage; for, except in the period of pregnancy, the arteries of the round ligament are very small; they are almost obliterated in women advanced in years; and in general, they are quite capillary in the extremity of the ligament adjoining the ring. Hence, it cannot be surprising, that so many crural herniæ have been successfully operated upon in women, by cutting the hernial sac and crural arch directly upward, while not a single instance can be cited of such an incision being made in man without mischief, although, in both sexes, the epigastric artery may have been avoided in operating by this process." (*Scarpa, Traité des Hernies, p.* 240.)

In operating for the crural hernia in males, Scarpa recommends us to follow a method, which he calls new, but which, in fact, is the same as that advised by Gimbernat. I have found (says Scarpa) that, in man, the neck of the hernial sac may be divided without danger, by giving to the incision a direction exactly contrary to that which is practised in the female subject. After having opened the hernial sac, it is to be drawn outward by one of its sides sufficiently to allow the introduction of a small director between its neck and the strangulated intestine, *the groove of the instrument being turned downwards towards the internal and inferior angle of the crural arch. A probe-pointed bistoury, the edge of which is also to be directed downwards towards the point of insertion of Poupart's ligament to the pubes, is to be pushed along the groove. By this means, the neck of the hernial sac will be divided its whole length, at its internal and inferior side, and Poupart's ligament will be cut close to its attachment to the top of the os pubis.* The epigastric artery will certainly be avoided, because it lies upon the opposite side of the hernial sac. As for the spermatic cord, I have demonstrated, that it is situated on the forepart of the neck of the hernial sac; consequently, it cannot be touched by an incision made from above downwards, whilst it is constantly cut in the ordinary method, since the knife is carried from below upwards. In the first case, this part may be the more easily avoided, as it lies at some distance from the internal and inferior angle of the crural arch. In fact, it is at this place that it quits, as we have seen, the edge of Poupart's ligament, in order to ascend towards the inguinal ring. The incision that I propose (says Scarpa) not only has the advantage of slitting open the neck of the hernial sac its whole length, it also divides a part of the insertion of Poupart's ligament into the upper part of the os pubis, a thing that gently contributes to relax the crural arch, and facilitate the reduction of the viscera; of those, at least, which are not adherent to the sac." (*Scarpa, Op. cit. p.* 235.)

Although this accurate anatomist and surgeon appears to be quite unacquainted with many of the late valuable publications on hernia, which have made their appearance in this country, it is curious to find, both in his account of the inguinal and crural hernia, how strongly his doctrines and observations tend to confirm every thing that has recently been insisted upon in modern works, respecting the place where the bubonocele first protrudes, its passing through a sort of canal before it comes out of the abdominal ring, the advantage of cutting in the crural hernia the internal and inferior angle of Poupart's ligament, or, in other terms, that part of the ligament which was first particularly pointed out by Gimbernat, as causing the principal part of the strangulation, and about which so much has been said by Mr. A. Cooper, Mr. Hey, &c.

Hesselbach considers an incision through the outer side of the crural ring safer than one through Gimbernat's ligament, and safer in women than men. In women, he recommends the cut to be made through the middle of the forepart of the ring, nearly straight upwards, or a little inclined inwards, in which mode the epigastric artery cannot be hurt, whether it lie at the outer, or inner side of the neck of the sac. In men, this incision, directed obliquely upwards and inwards, he says, cannot be made, on account of the nearness of the spermatic cord: therefore, in the male subject, he advises cutting the inner side of the opening, that is to say, Gimbernat's, or the femoral ligament directly inwards towards the symphysis of the os pubis. (*Ueber den Ursprung, &c. der Leisten-und-Schenkelbrüche, p.* 54.) When the epigastric, or obturator, artery deviates from its usual course, and surrounds the inner side of the neck of the hernia (which variety can never be ascertained a priori,) a wound of the vessel Hesselbach regards as unavoidable.

From the views taken of femoral hernia in this article, I consider the unrestricted direction, always to cut Gimbernat's ligament in the operation perfectly erroneous. For, as Langenbeck has stated, the seat of strangulation may either be in the external aperture of the crural canal, or in an opening of the front or inner side of this passage, or in its inner opening, where then Gimbernat's ligament is truly concerned. When the strangulation is of the two first descriptions, only the fascia lata need be cut; but, in the third, most frequent case, the inner semilunar edge of the internal opening of the ring must, of course, be divided. In all cases, says Langenbeck, whether the strangulation be caused by the inner or external opening of the crural canal, or by an aperture in the front parietes of this passage, the stricture must be cut inwards, as directing the cut in the least outwards would injure the epigastric artery. When it is perceived in the operation, that the neck of the hernial sac is strangulated, close below and behind the external pillar of the abdominal ring, then the inner opening of the crural canal must be divided inwards, with the knife directed along the horizontal ramus of the os pubis, under the external pillar of the ring, towards the symphysis of the pubes. If, in such a case, the knife were carried inwards and upwards, that part of Poupart's ligament forming the upper side of the crural canal might be cut, and the spermatic artery injured. (*Neue Bibl.* 2 *B. p.* 133.)

Dr. Trüstedt has published some remarks in favour of employing dilatation instead of an incision, in the operation for the strangulated crural hernia. He observes, that even when the common trunk of the obturatrix and epigastric arteries is short, the bowels may protrude under the first of these arteries, which will lie upon the upper and inner side of the hernia. In an operation performed upon a woman, in la Charité, at Berlin, for a strangulated femoral hernia, the crural ligament was divided in Gimbernat's way by an incision exactly parallel to the horizontal ramus of the os pubis, and the obturatrix artery was wounded. The patient died eight days after the operation, having been previously attacked by trismus and opisthotonos. On dissection, about six ounces of putrid blood were found in the lesser cavity of the pelvis, and the above artery cut. The vessel arose from the epigastric, ran over the upper edge of the inner opening of the crural canal, or ring, and then descended along its inner edge, towards the obturator foramen. This occasional course of the obturatrix artery leads Dr. Trüstedt to suggest the following rules: if, after the hernial sac is opened, the bowels cannot be returned, the outer opening of the crural canal should be cut directly inwards, in order to produce a considerable relaxation. But, if the reduction should yet be impracticable, (the strangulation being at the inner opening of the canal) then an attempt is to be made to insinuate the end of the finger through the constriction, a plan said to have answered very often in the practice of Surgeon-General Rust. Should the resistance be too great, however, for this method to succeed, Trüstedt advises the crural ligament to be forcibly drawn inwards and upwards, towards the navel, with Arnaud's tenaculum, assisted by the introduction of the finger, or with two hooks. When this plan fails, he recommends Schreger's practice of dividing the anterior edge of Poupart's ligament with a pair of blunt-pointed scissors, and then the use of Arnaud's tenaculum again. (See *Rust's Magazin für die gesammte Heilkunde, B.* 3, *H.* 2.) The consideration, however, which will ever prevent the common adoption of Dr. Trüstedt's suggestion, is, that fifty times more lives would be lost by the mischief done to the protruded bowels by the forcible introduction of the fingers and hooks, than by hemorrhage from the obturatrix, or epigastric artery, when the course of the vessel is irregular.

CONGENITAL HERNIA.

Before the beginning of the sixth month of the fœtal state, the testicle is situated near the kidney, where it receives a covering from the peritonæum, just like the other abdominal viscera. Between the beginning of the sixth month and end of the seventh, the testicle has either descended as low as just above the abdominal ring, or else is passing through it, or arrived a little below it. (*Wrisberg. Comm. Reg. Societ. Gotting.* 1765.)

When the testicle passes through the abdominal ring into the scrotum, it is received in a production of the peritonæum, which afterward constitutes the tunica vaginalis; while that peritonæal investment, which was given to the testicle in the loins, is closely adherent to this body, and forms what is named the tunica albuginea.

After the descent of the testicle into the scrotum, the communication between the cavity of the tunica vaginalis and that of the abdomen commonly becomes obliterated, which latter event is usually effected before birth, sometimes not till afterward, and, in a few subjects, even as late as the adult state.

In the congenital hernia, the protruded viscera are situated in the tunica vaginalis, in contact with the testicle: having descended into this position before the closure of the communication with the abdomen. Of course, the tunica vaginalis itself is the hernial sac. The nature of this case was not understood, before it was elucidated by Haller in 1755, and the two Hunters in 1762 and 1764. (See *Hunter's Med. Comment.*; *Haller's Opuscula Patholog. and Opera Minora, T.* 3.) Many particulars, relating to the origin and formation of this hernia, having been described in the 2d vol. of the First Lines of Surgery, I shall not here repeat them. Before the periods now named, surgeons imputed the circumstance of the contents of the hernia and testicle being in contact, to the bowels having made their way, by laceration, through the tunica vaginalis, from the ordinary hernial sac of a bubonocele. The old surgeons, indeed, frequently cite this instance in proof of their doctrine, that some herniæ were attended with a laceration of the peritonæum. (See *Sharp's Inquiry.*)

From the term *congenital*, we might suppose that this hernia always existed at the time of birth. The protrusion, however, seldom occurs till after this period, on the operation of the usual exciting causes of herniæ in general. It does not commonly happen till some months after birth; and, in certain instances, not till a late period. Mr. Hey relates a case in which a hernia congenita was first formed in a young man, aged sixteen, whose right testis had, a little while before the attack of the disease, descended into the scrotum. In the generality of cases which actually take place when the testicle descends into the scrotum before birth, the event may be referred to the testicle having contracted an adhesion to a piece of intestine, or omentum, in its passage to the ring. In an infant, which died a few hours after birth, Wrisberg found one testicle which had not passed the ring, adhering, by means of a few slender filaments, to the omentum, just above this aperture.

The appearance of a hernia in very early infancy, Mr. Pott observes, will always make it probable that it is of this kind; but he was not correct in asserting, that in an adult, there is no reason for supposing his rupture to be of this sort, but his having been afflicted with it from his infancy; and that there is no external mark, or character, whereby it can be certainly distinguished from one contained in a common hernial sac. This statement is erroneous, inasmuch as the hernia congenita is attended with an impossibility of feeling the testis, which part in the common scrotal hernia is always distinguishable under the fundus of the hernial sac. The hernia congenita, when returnable, "ought, like all other kinds of ruptures, to be reduced, and constantly kept up by a proper bandage; and when attended with symptoms of stricture, it requires the same chirurgic assistance as the common hernia."

Mr. Pott notices, "that in very young children, a piece of intestine, or omentum, may get pretty low down in the sac, while the testicle is still in the groin, or even within the abdomen. In this case, the application of a truss would be highly improper; for, in the latter, it might prevent the descent of the testicle from the belly into the scrotum; in the former, it must necessarily bruise and injure it, give a great deal of unnecessary pain, and can prove of no real use. Such bandage, therefore, ought never to be applied on a rupture in an infant unless the testicle can be fairly felt in the scrotum, after the gut or caul is replaced; and when it can be so felt, a truss can never be put on too soon."

Many additional observations on the foregoing topic are contained in the 2d vol. of the First Lines of Surgery, for which reason I do not here expatiate upon it. Mr. Pott explains, that an old rupture, originally congenital, is subject to a stricture made by the sac itself, as well as to that produced by the abdominal ring, or, as might have been added, to that caused by the inner opening of the inguinal canal.

The fact he noticed several times, both in the dead and in the living. "I have seen (says he) such stricture made by the sac of one of these herniæ, as produced all those bad symptoms which render the operation necessary: and I have met with two different strictures, at near an inch distance from each other, in the body of a dead boy, about fourteen, one of which begirt the intestine so tight that I could not disengage it without dividing the sac.

"In this kind of hernia I have also more frequently found connexions and adhesions of the parts to each other than in the common one; but there is one kind of connexion sometimes met with in the congenital hernia which can never be found in that which is a common hernial sac, and which may require all the dexterity of an operator to set free; I mean that of the intestine with the testicle.

"When a common hernial sac has been laid open, and the intestine and omentum have been replaced, there can be nothing left in it which can require particular regard from the surgeon; but by the division of the sac of a congenital hernia, the testicle is laid bare, and after the parts composing the hernia have been reduced, will require great regard and tenderness in all the future dressings, as it is a part very irritable, and very susceptible of pain, inflammation, &c.

"If a large quantity of fluid should be collected in the sac of a congenital hernia, and by adhesions and connexions of the parts within, the entrance into it from the abdomen should be totally closed, (a case which I have twice seen) the tightness of the tumour, the difficulty of distinguishing the testicle, and the fluctuation of the fluid, may occasion it to be mistaken for a common hydrocele; and if, without attending to other circumstances, but trusting merely to the feel and look of the scrotum, a puncture be hastily made, it may create a great deal of trouble, and possibly do fatal mischief.

"By what has fallen within my observation, I am inclined to believe that the sac of a congenital hernia is very seldom, if ever, distended to the degree which a common hernial sac often is: it also, from being less dilated, and rather more confined by the upper part of the spermatic process, generally preserves a pyriform kind of figure, and for the same reason, is also generally thinner, and will therefore require more attention and dexterity in an operator when he is to open it. To which, I believe, I may add, that common ruptures, or those in a common sac, are generally gradually formed, that is, they are first inguinal, and by degrees become scrotal; but the congenital are seldom, if ever, remembered by the patient to have been in the groin only." (*Pott on Ruptures, Vol.* 2.)

The sac of a congenital hernia, especially when the case is strangulated, is every where equally tense, (*Hesselbach, p.* 36) and below it the testis cannot be felt.

The reader must not conclude, however, from the above account, that every rupture in children is congenital. Mr. Lawrence has related a case of strangulated bubonocele, which took place in an infant only fourteen months old. (*P.* 65, *Edit.* 3.)

The common inguinal hernia, which first protrudes at the inner opening of the inguinal canal, and which has the epigastric artery on the inner side of its neck, has been named by Hesselbach *external*, while the less common instance, in which the viscera burst directly through the aponeuroses of the transverse and internal oblique muscles, and pass directly out of the abdominal ring, leaving the epigastric artery on the outer side of the neck of the sac, is distinguished by the epithet *internal.* (*Anat. Chir. Abhandlung über den Ursprung der Leistenbruch, Wurzb.* 1806.) "The inguinal congenital hernia (says Scarpa) cannot be divided into *external* and *internal*: it is evident, that it must always be external, since the neck of the tunica vaginalis invariably corresponds to the point, at which the spermatic cord passes under the margin of the transverse muscle. As for other circumstances, the tunica vaginalis lies in its whole course in the same manner as the sac of a common inguinal hernia: like this, it passes completely through the inguinal canal from one end to the other, resting upon the anterior surface of the spermatic cord. Consequently, it passes between the separation of the inferior fibres of the obliquus internus, and the principal origin of the cremaster muscle. (See *Wrisberg. syllog. comment. anat. p.* 23.) After coming out of the ring, as it is always united to the spermatic cord, it is enclosed in the muscular and aponeurotic sheath of the cremaster muscle, which accompanies it to the bottom of the scrotum. Since the tunica vaginalis, including the displaced viscera, enters the inguinal canal on the outside of the point, at which the spermatic cord crosses the epigastric artery, it is manifest, that, as it follows exactly the direction of this cord, it must also cross the artery, and remove it from the outer to the inner side of the ring, according to the mechanism already explained in speaking of the common inguinal hernia. Hence, the displacement of the epigastric artery constantly happens in the inguinal congenital, just as it does in the ordinary external inguinal hernia.

"But, if these two species of inguinal herniæ have some analogy to each other, in regard to the parts which constitute them, yet, they present some remarkable differences. 1. The common inguinal hernia, whether internal or external, when it extends into the scrotum, cannot descend beyond the point at which the spermatic vessels enter the testicle. There the cellular substance of the spermatic cord terminates. There the hernial sac must unavoidably terminate. On the contrary, in the congenital hernia, the viscera may descend lower than the testicle, with which they are in immediate contact; and, at length, they even occupy the situation of this organ, which is then pushed upward and backward. 2. In the case of a congenital hernia, the descent of the viscera from the groin to the scrotum commonly takes place in a very short time, and in some measure precipitately: it is much slower and more gradual in the ordinary inguinal hernia. The reason of this difference is very plain. In the first case, the descent of the testicle, and the formation of the tunica vaginalis, have opened and prepared the way, which the viscera must follow in forming a protrusion; while, in the second, the hernial sac cannot descend into the scrotum, but by gradually elongating the layers of the cellular substance, which joins it to the surrounding parts. This fact is so generally known, that experienced practitioners consider the promptitude, with which the viscera have descended from the groin to the bottom of the scrotum, as a characteristic sign of a scrotal congenital hernia." (*Scarpa, Traité des Hernies, p.* 73, *&c.*; *Hesselbach, p.* 35; *Pott &c.*)

If circumstances will admit of a truss being applied and worn, in cases of congenital hernia, in young subjects, there will be a considerable chance of a radical cure being effected, in consequence of the natural propensity of the opening between the abdomen and tunica vaginalis to become closed.

The only material difference in the operation, from that for a bubonocele, is, that the surgeon has to lay open the tunica vaginalis, instead of a common hernial sac. The stricture is to be divided on the same principle as that of an inguinal hernia, and much in the same manner. As, in a case of congenital hernia, the parts are always protruded on the outside of the epigastric artery, the stricture may be safely divided towards the ilium, as well as directly upwards. (*Lawrence on Ruptures, p.* 481, *Edit.* 3.) The parts having been reduced, the edges of the wound are to be immediately brought together, and retained so by means of one or two sutures, and sticking plaster, which is much preferable to the plan of applying dressings to the testicle and inside of the tunica vaginalis, so as to heal the part by the granulating process.

A new species of hernia congenita was described by the late Mr. Hey, in which a common peritonæal hernial sac, containing the viscera, is included in the tunica vaginalis. It arises from the parts being protruded after the communication, between the abdomen and tunica vaginalis, is closed, so that the peritonæum is carried down along with the intestine, and forms a hernial sac, within the tunica vaginalis. It is evident also, that such a hernia can only be produced, while the original tunica vaginalis remains, in the form of a bag, as high as the abdominal ring.

Operators should be aware of the possibility of having a sac to divide after laying open the tunica vaginalis. (See the accounts of this hernia in *Hey's Practical Observations, p.* 221, *&c. and A.,Cooper's Work on Inguinal Hernia, p.* 59.)

UMBILICAL HERNIA, OR EXOMPHALOS.

"The exomphalos, or umbilical rupture, (says Pott) is so called from its situation, and has (like other herniæ) for its general contents, a portion of intestine, or omentum, or both. In old umbilical ruptures, the quantity of omentum is sometimes very great. Mr. Ranby says, that he found two ells and a half of intestine in one of these, with about a third part of the stomach, all adhering together. Mr. Gay and Mr. Nourse found the liver in the sac of an umbilical hernia; and Bohnius says, that he did also. But whatever are the contents, they are originally contained in the sac, formed by the protrusion of the peritonæum. In recent and small ruptures, this sac is very visible; but in old, and large ones, it is broken through at the knot of the navel, by the pressure and weight of the contents, and is not always to be distinguished; which is the reason why it has by some been doubted whether this kind of rupture has a hernial sac or not.

"Infants are very subject to this disease in a small degree, from the separation of the funiculus; but in general they either get rid of it as they gather strength, or are easily cured by wearing a proper bandage. It is of still more consequence to get this disorder cured in females, even than in males, that its return, when they are become adult, and pregnant, may be prevented as much as possible; for at this time it often happens, from the too great distention of the belly, or from unguarded motion when the parts are upon the stretch. During gestation, it is often very troublesome, but, after delivery, if the contents have contracted no adhesion, they will often return, and may be kept in their place by a proper bandage.

"If such bandage was always put on in time, and worn constantly, the disease might in general be kept within moderate bounds, and some of the very terrible consequences which often attend it might be prevented. The woman who has the smallest degree of it, and who, from her age and situation, has reason to expect children after its appearance, should be particularly careful to keep it restrained.

"In some the entrance of the sac is large, and the parts easily reducible; in others they are difficult, and in some absolutely irreducible. Of the last kind many have been suspended for years in a proper bag, and have given little or no trouble. They who are afflicted with this disorder, who are advanced in life, and in whom it is large, are generally subject to colics, diarrhœas, and, if the intestinal canal be at all obstructed, to very troublesome vomitings. (Hence, patients are often supposed to labour under a stricture, when they really do not.) It therefore behooves such to take great care to keep that tube as clean and free as possible, and neither to eat nor drink any thing likely to make any disturbance in that part." (*Pott on Ruptures, Vol.* 2.)

Authors, who have published since the time of this celebrated surgeon, have not added much to the stock of information which he has left, relative to the exomphalos. The writings of Mr. A. Cooper, Scarpa, (*Traité des Hernies, p.* 327) and of all the most accurate moderns, confirm the fact described by Pott, that, in the umbilical rupture, there is a hernial sac, just as in other instances of herniæ. Every one, acquainted with anatomy, knows, that behind the opening in the linea alba at the umbilicus, the peritonæum is complete, and consequently must protrude along with the viscera, in cases of exomphalos. In the only two cases which Mr. A. Cooper has seen of a deficiency of the sac, the membrane had been partially absorbed, or lacerated, so as to allow the protrusion of its contents, and threaten, from this cause, a double stricture. Similar appearances, less closely inspected, probably gave rise to the opinion so firmly maintained by Dionis, De la Faye, Garengeot, and J. L. Petit, that, in the umbilical hernia, the peritonæum was always lacerated, and there was no hernial sac. According to Bichat, early infancy is most subject to the *umbilical* hernia, strictly so called, in which the parts protrude through the navel; while the other periods of life are more liable to false umbilical herniæ, or such as arise in the vicinity of the umbilicus. (*Œuvres Chir. de Desault, T.* 2. *p.* 315.)

Besides a true hernial sac, the exomphalos is also covered by a more superficial expansion, consisting of condensed cellular substance. In operating, however, a surgeon should always cut with great caution; for, the integuments and hernial sac, in front of the tumour, are inseparably adherent; and sometimes, in large cases, when an absorption of part of the sac has been caused by the pressure of the bowels, they are even found adherent to the integuments.

Pregnant women, and dropsical and corpulent subjects, are peculiarly liable to the exomphalos. In adults, when there is intestine in the sac, there is almost always omentum. The transverse arch of the colon is observed to be particularly often contained in umbilical herniæ, but the small intestines are not unfrequently protruded; and even the cœcum has been found in a rupture at the navel. (See *Lawrence on Ruptures, p.* 427, *Edit.* 3.)

In the true umbilical hernia, the stricture is made by the tendinous opening in the linea alba. Let us next consider the umbilical hernia in the three particular forms, in which it has been noticed by the latest writers.

CONGENITAL UMBILICAL HERNIA.

Dr. Hamilton has met with about two cases of this kind annually, for the space of seventeen years; and they strictly deserve the epithet *congenital*, as they appear at birth. The funis ends in a sort of bag, containing some of the viscera, which pass out of the abdomen through an aperture in the situation of the navel. The swelling is not covered with skin, so that the contents of the hernia can be seen through the thin distended covering of the cord. The disease is owing to a preternatural deficiency in the abdominal muscles, and the hope of cure must be regulated by the size of the malformation, and quantity of viscera protruded.

The plans of cure proposed, consist of the employment of a ligature, or of a bandage. The latter seems preferable, and was practised by Mr. Hey, as follows: having reduced the intestine, he desired an assistant to hold the funis compressed sufficiently near the abdomen, to keep the bowel from returning into the hernial sac.

"I procured (says he) some plaster spread upon leather, cut into circular pieces, and laid upon one another in a conical form. This compress I placed upon the navel, after I had brought the skin on each side of the aperture into contact, and had laid one of the lips a little over the other. I then put round the child's abdomen a linen belt; and placed upon the navel, a thick, circular, quilted pad, formed about two inches from one extremity of the belt.

"This bandage kept the intestine securely within the abdomen, and was renewed occasionally. The funis was separated about a week after birth; and at the expiration of a fortnight from that time, the aperture at the navel was so far contracted, that the crying of the child, when the bandage was removed, did not cause the least protrusion. I thought it proper, however, to continue the use of the bandage a little while longer. A small substance, like fungous flesh, projected, after the funis had dropped off, about half an inch from the bottom of that depression which the navel forms. A dossil of lint spread with cerat. e lapide calaminari, and assisted by the pressure of the bandage, brought on a complete cicatrization." (*P.* 227.)

This gentleman has related another example, in which the intestines were quite uncovered and inflamed, the sac having burst in delivery. The parts were reduced; but the child died. (See *also G. A. Fried de Fœtu intestinis plane nudis extra abdomen propendentibus nato. Argent.* 1760.)

UMBILICAL HERNIA IN CHILDREN.

The umbilical hernia, which is sometimes formed in the fœtus, from causes difficult of explanation, takes place, in other instances, at the moment of delivery; and then, as Sabatier remarks, should it be tied by mistake, with the funis, death would be the consequence. Most frequently, however, it is not till the second, third, or fourth month after birth, that the disease occurs; and the numerous cases collected by Desault prove that, of ten infants attacked with this hernia, nine become afflicted at the periods just mentioned.

The umbilicus, still open, now begins to contract, so as to close the cicatrix, which soon forms an obstacle capable of preventing a protrusion of the viscera. Sometimes, however, the repeated crying of the child propels the viscera through the opening, and thus the closure of the cicatrix of the navel is prevented. By degrees, the umbilical ring becomes more and more dilated, the quantity of protruded bowel increases, and thus a tumour arises, which, from being of trivial size at first, at length attains the size of an egg, or large walnut, and presents itself with all the characteristic marks of a hernia.

The presence of a piece of intestine and omentum in the tumour, keeps the umbilicus open, and opposes the continual tendency which it has to close. Such tendency, however, being sometimes superior to the resistance of the protruded parts, forces them back into the abdomen, obliterates the opening through which they passed, and thus the spontaneous cure of the umbilical hernia in children is accomplished. Two cases illustrative of this fact, are related by Bichat. (*Œuvres Chir. de Desault, T.* 2, *p.* 318.)

Nature, however, does not effect many such cures, and when the case is left to her alone, she not only fails in bringing about a radical cure, but gradually renders it impossible. In short, the propensity of the opening to close diminishes, and is lost, as the subject grows older.

Thus, the umbilical hernia of children seems to be essentially different from that of adults, in the tendency of the aperture to contract. Hence the ease of affecting a radical cure in children, and the almost utter impossibility of doing so in adults. In the former, it is enough to keep the intestines from protruding, and the opening becomes of itself obliterated; in the latter, the opening always remains, whether the bowels continue in it or not. This indisposition of the aperture to contract in the adult, also frequently depends upon the protrusion not being through the umbilical ring itself, but through a fissure in the vicinity of it, not endued with the same natural tendency to close, which the umbilicus possesses in young subjects. In fact, it would appear from the observations of Scarpa, detailed in the 2d vol. of the First Lines of Surgery, that, unless a grown-up person has the protrusion from infancy, it never occurs exactly through the umbilical ring itself.

The means of curing the umbilical hernia of children, are of three kinds; external applications; compression; and the ligature. The first are totally useless; and as they occasion a waste of time, are improper. Compression, and the ligature, are the only rational plans. The former is the most modern; the latter the most ancient treatment, as it is mentioned by Celsus. Desault tells us, that the design both of the ligature and compression is the same, viz. to prevent the lodgment of the protruded viscera in the opening of the umbilicus, and thus facilitate the approximation of its sides. To accomplish this end, the ligature retrenches the hernial sac, and skin pushed before it; and, by the union of the cut parts, a cicatrix is produced, which hinders the protrusion of the viscera. At the same time, the sides of the opening, obeying their natural tendency, compression closes the deficiency, or opening, in the parietes of the abdomen, hinders the protrusion of the bowels, and keeps these parts from resisting the contraction of the sac. Desault remarks, that though compression occasions no pain, it is irksome, during the great length of time its employment is necessary. The ligature (he says) produces momentary pain; but it is not at all irksome, and it effects in a few days, what compression, when successful, accomplishes in several months. In one plan, long continual attention is requisite, and if its employment be only for a short time neglected, the previous effect becomes almost destroyed. The other method always accomplishes its object with certainty, independently of the crying of the child, and the care of its attendants. When compression is adopted, it is executed either by means of a flat compress applied to the opening, and which does not enter it, or else by means of some round or oval body, such as a ball of wax, a nutmeg, &c. adapted to the shape of the aperture, and, as Platner and Richter, (in his Treatise on Hernia) advise, continually kept within the opening. In the first case, Bichat argues, that if the bandage be exactly applied, the skin and sac will form a fold in the aperture of the navel, hinder its closure, and operate in the same manner, from without, inward, as the protruded intestines did from within outward. In the second case, he observes, the foreign body, being depressed into and maintained in the opening, will occasion, notwithstanding what Richter says, the same inconveniences, and, in a more striking manner, similar consequences. But, on the contrary, when the ligature is employed, the sac and skin of the tumour are removed, while the opening remains free, and nothing prevents its obliteration. In this method, the omentum can never protrude outward; but, in the other, if the compression should ever be inexact, the parts slip out again, above or below, and the disorder prevails on one side of the useless application. The ligature is also commended as producing an adhesion of the sides of the opening, either to each other, or the adjacent parts. This adhesive process arises from the inflammation excited, and occasions a degree of firmness, not producible by any other mode of cure.

With respect to compression, Bichat asserts that children, on whom it is employed, are miserably annoyed with it for years, while the ready success of the treatment with the ligature, is attested by a series of well-authenticated cures, which in Desault's practice, amounted to the number of fifty. In the latter years of his practice, says Bichat, many persons were also seen bringing to his public consultations their children, which were immediately operated on without any preparation, carried home, and brought the next, and every following day, to be dressed, till the cure was complete.

The children of the poor may be cured in an hospital, with the ligature, in the space of a few days. But, when compression is adopted, the parents are frequently put to repeated expense, as the bandage wears out; and to additional loss from the time consumed in paying the necessary attention.

The ancients had different modes of applying the ligature. One consisted in reducing the parts, and afterward tying the integuments and sac, without opening the latter at all. In the other, an incision was made in the sac, either before or after tying it, for the purpose of being sure, that no piece of intestine was, and could become, strangulated in the ligature. Celsus adopted the first plan; Paulus Ægineta preferred the second; and he was imitated by Avicenna, Albucasis, and Guy de Chauliac.

The first of these methods is less painful, and equally safe; for, we soon become habituated to ascertaining, whether there is still any intestine in the sac, by rubbing the opposite sides of this bag against each other. The other, which is unnecessarily cruel, increases the pain, without making the method at all more successful. Some of the old practitioners simply tied the base of the tumour; others passed through it one, or two needles, armed with ligatures for the purpose of fixing such ligatures in a better manner, and, for this purpose, they even sometimes made a circular incision. Desault's method, which much resembled that of Saviard, was simple, and is described by Bichat as attended with little pain.

The child must be placed on its back, with its thighs a little bent, and its head inclined towards the chest. The surgeon is to reduce the protruded parts, and to hold them so with his finger, at the same time that he raises the hernial sac, and rubs its sides between his fingers, so as to be sure that there is nothing contained in it. Being certain, that the parts which he lifts up, are only the skin and sac, he is to direct an assistant to surround their base several times with a waxed ligature, of middling size, each turn being tied with a double knot, in such a manner as only to occasion little pain. The tumour, thus tied, is to be covered with lint, which is to be supported with one or two compresses, and a circular bandage, secured with a scapulary. By the following day a slight swelling has commonly taken place in the constricted parts.

On the second, or third day, the parts shrink, and then the ligature becomes loose, so that a fresh one must now be applied in the same manner as the first, taking care to draw it a little more tightly. The sensibility of the parts, increased by the inflammation, which the constriction of the ligature has already produced, usually renders this second ligature more painful. After the operation, the same dressings, as at first, are to be applied. The tumour soon becomes discoloured, livid, and smaller. A third ligature, put on in the same way as the preceding ones, entirely obstructs the circulation in it. The part turns black and flaccid, and commonly falls off on the eighth or tenth day. A small ulcer is left, which, being properly dressed, very soon heals, and leaves a cicatrix sufficiently strong to resist the impulse occasioned by coughing, or other efforts of the abdominal muscles. For two or three months, however, after the operation, the child should wear a circular bandage, in order to prevent, with still greater certainty, the viscera from being propelled against the cicatrix, so as to interrupt the process of nature, which is now producing a gradual closure of the umbilical opening. Numerous cases might here be adduced, in confirmation of the above practice; but, several (nine) are already published in the Parisian Chirurgical Journal.

But one may doubt, (says Sabatier) quoting the article in the journal, where Desault treats of the present disease, whether the infants got rid of the hernia, as it might have returned some time afterward. To this observation, Bichat replies, that numerous facts remove the doubt; for, several of the subjects were brought to Desault's public consultation, for other diseases, a long while after they had been operated upon, and the great number of students, who examined them, all acknowledged, that the ring was completely obliterated, and there was no impulse of the viscera in coughing, sneezing, &c. Other children, in the knowledge of the surgeons of the Hôtel-Dieu, remained perfectly cured, and Bichat was acquainted with two young subjects, on whom the operation had been performed four years, and they had had no relapse.

In young infants the operation almost constantly answered; but, in proportion as their age increased, it was found to be less certain. Bichat relates three cases, which tend to prove, that success may be completely obtained at the age of a year and a half; that the cure is difficult, when the child is four years old; and impossible, when it is nine. (See *Œuvres Chir. de Desault, par Bichat, T.* 2, *p.* 315, *&c.*)

Mr. Pott notices the plan of curing the exomphalos with the ligature, and expresses himself strongly against the practice in general. To adults the plan is not applicable, particularly when the tumour is large. Mr. Pott was decidedly in favour of compression, and he observes, that, in young subjects, and small herniæ, a bandage, worn a proper time, generally proves a perfect cure. (*Vol.* 2.)

Anxious that this work should be strictly impartial, I next proceed to relate what has been more recently urged against the employment of the ligature for the cure of the umbilical hernia in children.

The incessant care that a bandage requires, either to keep it clean or make it always keep up the proper degree of pressure, renders its employment difficult in the children of the poorer classes. Scarpa expresses his opinion, that "this was what induced Desault to revive the operation for the umbilical hernia by the ligature, nearly such as is described by Celsus, an operation (continues Scarpa) which, a long while since, and for good reasons, was altogether abandoned. Celsus has sufficiently described the particulars of it: (*Lib.* 7, *Cap.* 14,) he states, that the tumour is sometimes to be simply tied, and that, in other instances, its base is to have a needle and double ligature introduced through it, in order that it may be embraced almost in the same way as a staphyloma is tied. But among the causes which contraindicate this operation, he mentions so many circumstances in relation to age, constitution, diseases of the skin, &c. that he seems to consider the cases, in which it may be practised with success, as very few. The same reflections were made by several other ancient surgical writers, especially by Fabricius ab Aquapendente. Desault himself has put some restrictions to the employment of the ligature, since he observes, with his usual candour, that this method does not radically cure the umbilical hernia of children, arrived at the age of four years; that it is indispensable, as Celsus inculcates, to employ a needle and double ligature, when the base of the tumour is very large; and lastly, that even in the youngest children, a radical cure cannot be effected by the ligature, unless a methodical compression of the navel, by means of a bandage, be kept up immediately after the operation, and for two or three months. It is perhaps to the omission of this last means, that a relapse is to be ascribed in several of the children operated upon by Desault. "*Desault avoit remis en vigueur la ligature tombée en désuétude. Il s'abusoit sur sa valeur; et il n'est pas difficile d'en connoître la cause. Tous les enfans qu'il opéroit à l'Hôtel-Dieu sortoient guéris et n'y revenoient plus: on regardoit alors comme radicale une guérison momentanée.*" (*Richerand, Nosographie Chir. T.* 2, *p.* 456.) I have carefully watched (says Scarpa) the immediate effects, and the more or less remote consequences of tying the umbilical hernia, either simply or by means of a needle and double ligature; and, after a considerable number of such cases, I believe I can assert, that *this operation, howsoever performed, is not always exempt from grave and sometimes dangerous accidents. I can also add, that it never procures a truly radical cure, unless the cicatrix, occasioned by it in the umbilical region, be submitted for some months to a methodical and uninterrupted compression. It is not so uncommon, as some surgeons pretend, to see arise after the application of the ligature, a fever attended with symptoms of most violent irritation, and acute sufferings, which cause incessant crying, and sometimes convulsions. The ulcer, which is produced by the detachment of the swelling, is always very large and difficult to heal. Every now and then it becomes painful, and emits fungous granulations, even though dressed with dry applications.*

"Latterly, it has been explained by a celebrated surgeon, (*Paletta Memor. del' Insti-*

tute, Tom. 2, *Part* 1.) that the umbilical vein and the suspensory ligament of the liver, being included in the ligature of the umbilical hernia, the inflammation which originates in these parts may, perhaps, in certain cases, be communicated to the liver, so as to put the child's life in great danger. When, in consequence of the ligature, symptoms of violent irritation come on, they are ordinarily attributed to certain individual circumstances, such as extreme sensibility, or a particular disposition to spasm. Hence, it is believed, that they should be considered as exceptions, which do not exclude the general rule, and prove nothing against the utility of the operation. But how (says Scarpa) can the surgeon ascertain the existence or nonexistence of these individual dispositions in the children upon which he is to operate? Assuredly those subjects, in which I have had occasion to notice the above accidents, enjoyed, before the operation, perfect health in every respect.

"Whatever process be adopted for tying the umbilical hernia, it is evident that the tumour can only be constricted as far as a little way on this side of the aponeurotic ring of the umbilicus, whence it follows that the integuments must always remain prominent and relaxed for a certain extent, at the front and circumference of this opening. Also, after the separation of the strangulated portion, there necessarily remains, under the cicatrix, a portion of the hernial sac, and of the loose integuments which covered it; and as the cicatrix itself never acquires sufficient firmness to resist the impulse of the viscera, which tend to insinuate themselves into the remains of the hernial sac, the hernia sooner or later reappears, and, in a short time, becomes larger than it was before the operation. If the subject is a little girl, it may be apprehended, that the first pregnancy will cause a recurrence of the hernia; for, it is known, that, during gestation, the external cicatrix of the umbilicus is considerably distended, and much disposed to give way."

Pott has seen terrible accidents caused by the rupture of the cicatrix at the navel, during pregnancy. (*Chirurg. Works, Vol.* 2, *p.* 169.) It is true that, according to this writer, this cicatrix was not the consequence of a hernia, but rather of an abscess in the umbilical region, which abscess had formerly been opened with a bistoury; yet, observes Scarpa, it would not be impossible to raise doubts upon this conjecture. Lastly, after the separation of the tumour, there always remains, between the aponeurotic ring of the navel and the integuments, a small cavity, formed by the neck of the hernial sac; a cavity into which the viscera begin to insinuate themselves after the operation, so as to hinder the complete contraction of the umbilical ring. The demonstration of what I have advanced is, in some measure, to be found in the old method of operating for the inguinal hernia, not in a strangulated state, by the ligature of the hernial sac and spermatic cord. Most of the herniæ, operated upon by this barbarous process, were subject to relapses, because, in all probability, the cicatrix was not sufficiently firm to resist the impulse of the viscera, which entered the remains of the hernial sac. In the same manner, after the common operation for the strangulated inguinal hernia, although the cicatrix is formed very near the ring, there is no prudent surgeon who does not advise the patient to wear a bandage the rest of his life, observation having proved that the hernia is still liable to recur.

"The experience of several ages leaves no doubt, that compression alone is an extremely efficacious method of radically curing the umbilical hernia of young subjects. It is attended with no risk, and, provided it be executed with the requisite caution, it is hardly ever necessary to continue it longer than two or three months for the purpose of obtaining a complete cure. On the other side, if it be clearly proved, by all that I have been observing, that the ligature never accomplishes a perfect cure without compression, it is manifest, that it cannot be at all advantageous for the children of the poor, since a bandage cannot be dispensed with. It may be said, that in general it does not shorten the treatment; for, in the most successful cases, the ulcer caused by it is not healed in less than a month, and, in order to make the cure certain, an exact compression must afterward be kept up, by means of a bandage, two months longer. It has already been stated, that three months are ordinarily sufficient for obtaining a radical cure by the mere employment of a compressive bandage." (*Scarpa, Traité des Hernies, p.* 344—349.)

In the Journal Général de Médecine, T. 41, 1811, M. Girard has published a memoir on the umbilical hernia of children, which was read to the Medical Society of Lyons in May, 1811, and the object of which was to recommend compression as an effectual means of cure. The arguments used were very similar to those adduced by Scarpa. In the course of the discussion, M. Cartier affirmed, that he had seen many children operated upon by Desault, who were not cured of their herniæ.

The subject was afterward taken up by the Medical Society of Paris, and the result of the debate was, that the employment of the ligature ought to be rejected. 1. Because the cure of umbilical herniæ is often accomplished by nature alone. 2. Because compression, either alone or aided by tonic remedies, always succeeds. 3. Because the operation of the ligature deserves the triple reproach of being painful, and not free from danger, if unfortunately a piece of intestine should chance to be included in the ligature; of not succeeding in general, except with the assistance of compression; and of being sometimes uselessly practised, as Desault himself gives us instances of. According to M. Cayol, the insufficiency of the ligature was long since acknowledged by Sabatier, Lassus, Richerand, &c.

UMBILICAL HERNIA IN ADULT SUBJECTS.

This case is to be treated on the principles common to all ruptures. When reducible, the parts should be kept up with a bandage or truss; which plan, however, in grown-up persons affords no hope of a radical cure. Mr. Hey has described some very good trusses for the exomphalos, which are applicable to children, when compression is preferred, as well as to adult subjects. One was invented by the late Mr. Marrison, an ingenious mechanic at Leeds.

"It consists of two pieces of thin elastic steel, which surround the sides of the abdomen, and nearly meet behind. At their anterior extremity they form conjointly an oval ring, to one side of which is fastened a spring of steel of the form represented. At the end of this spring is placed the pad or bolster that presses upon the hernia. By the elasticity of this spring the hernia is repressed in every position of the body, and is thereby retained constantly within the abdomen. A piece of calico or jean is fastened to each side of the oval ring, having a continued loop at its edge, through which a piece of tape is put, that may be tied behind the body. This contrivance helps to preserve the instrument steady in its proper situation. (*Practical Obs. in Surgery, p.* 231.) And, in the second edition of the preceding work, another truss for the exomphalos is described, the invention of Mr. Eagland, of Leeds, but as some account is given of this instrument, with an engraving, in the 2d. vol. of the First Lines of Surgery, I shall not here repeat the description.

When the exomphalos is irreducible, and large, the tumour must be supported with bandages.

"It is observed by Scarpa, that the umbilical hernia, and those of the linea alba, are less subject to be strangulated than the inguinal and femoral hernia; but that, when they are unfortunately affected with strangulation, the symptoms are more intense, and gangrene comes on more rapidly, than in every other species of rupture. If the operation be performed, the event is frequently unfavourable, because it is generally done too late. This practical fact is proved by the experience of the most celebrated surgeons of every age. "*Il est certain* (says Dionis) *que de cette opération il en périt plus qu'il n'en réchappe.*" (*Cours d'Opérations, p.* 98, *Ed.* 1777, *avec les notes de la Faye.*) He also adds, that they who have the misfortune to be afflicted with an exomphalos, should rather dispense with their shirt than a bandage. Heister says nearly the same thing. (*Institut. Chirurg. T.* 2, *Cap.* 94.)

When the omentum alone is strangulated in the exomphalos, or hernia of the linea alba, observation proves, that the symptoms are not less intense, than when the intestine is also incarcerated. There is this difference, however, that when the omentum alone is strangulated, only nausea occurs, and, if vomiting should likewise take place, it is less frequent and violent than when the bowel itself is strangulated. In the first case, the stools are hardly ever entirely suppressed. The proximity of the stomach is, no doubt, the reason why the strangulation of the omentum, in the umbilical hernia, occasions far more intense symptoms of sympathetic irritation than the strangulation of the same viscus in the inguinal or crural hernia.

Here the operation is not only always necessary, but urgently required. It is not materially different from that which is practised for the strangulated inguinal and crural herniæ; but, in general, it demands greater circumspection, on account of the connexion or intimate adhesions, which frequently exist between the integuments and hernial sac, and also the adhesions which often prevail between the latter part and the omentum which it contains. The situation of the intestine, which is frequently covered by and enveloped in the omentum, is another circumstance deserving earnest attention. (*Scarpa, Traité des Hernies, p.* 361, 362.)

Mr. Pott is not such an advocate as Scarpa for the early performance of the operation in cases of exomphalos: "The umbilical, like the inguinal hernia, becomes the subject of chirurgic operation, when the parts are reducible by the hand only, and are so bound as to produce bad symptoms. But though I have in the inguinal and scrotal hernia advised the early use of the knife, I cannot press it so much in this; the success of it is very rare, and I should make it the last remedy. Indeed, I am much inclined to believe, that the bad symptoms which attend these cases are most frequently owing to disorders in the intestinal canal, and not so often to a stricture made on it at the navel, as is supposed. I do not say that the latter does not sometimes happen; it certainly does; but it is often believed to be the case when it is not.

"When the operation becomes necessary, it consists in dividing the skin and hernial sac, in such manner as shall set the intestine free from stricture, and enable the surgeon to return it into the abdomen. (*Pott on Ruptures.*)

The rest of the conduct of the surgeon is to be regulated by the usual principles.

The division of the stricture is properly recommended to be made directly upward, in the course of the linea alba.

In consequence of the great fatality of the usual operation for the exomphalos, I think the plan suggested, and successfully practised by Mr. A. Cooper in two instances, should always be adopted, whenever the tumour is large, and free from gangrene; a plan, that has also received the high sanction of that distinguished anatomist and surgeon, Professor Scarpa. (*Traité des Hernies, p.* 362.) Perhaps, I might safely add, that, when the parts admit of being reduced, without laying open the sac, this method should always be preferred. It consists in making an incision just sufficient to divide the stricture, without opening the sac at all, or at all events, no more of it, than is inevitable.

In umbilical herniæ, of not a large size, Mr. C. recommends the following plan of operating: "As the opening into the abdomen is placed towards the upper part of the tumour, I began the incision a little below it, that is, at the middle of the swelling, and extended it to its lowest part. I then made a second incision at the upper part of the first, and at right angles with it, so that the double incision was in the form of the letter T, the top of which crossed the middle of the tumour. The integuments being thus divided, the angles of the incision were turned down, which exposed a considerable portion of the hernial sac. This being then carefully opened, the finger was passed below the intestines to the orifice of the sac at the umbilicus, and the probe-pointed bistoury being introduced upon it, I directed it into the opening at the navel, and divided the linea alba downwards, to the requisite degree, instead of upwards, as in the former operation. When the omentum and intestine are returned, the portion of integument and sac, which is left, falls over the opening at the umbilicus, covers it, and unites to its edge, and thus lessens the risk of the peritonæal inflammation, by more readily closing the wound." (*On Crural and Umbilical Hernia.*)

LESS FREQUENT KINDS OF HERNIA.

The *ventral hernia*, described by Celsus, is not common; it may appear at almost any point of the anterior part of the belly, but is most frequently found between the recti muscles. The portion of intestine, &c. is always contained in a sac, made by the protrusion of the peritonæum. Mr. A. Cooper imputes the disease to the dilatation of the natural foramina for the transmission of vessels, to congenital deficiencies, lacerations, and wounds of the abdominal muscles, or their tendons. In small ventral herniæ, a second fascia is found beneath the superficial one; but, in large cases, the latter is the only one covering the sac.

Herniæ in the course of the linea alba sometimes occur so near the umbilicus, that they are liable to be mistaken for true umbilical ruptures. They may take place either above, or below the navel. The first case, however, is more frequent than the second, and the following is the reason of this circumstance according to the opinion of Scarpa. "The upper half of the linea alba, that which extends from the ensiform cartilage to the umbilicus, is naturally broader and weaker, than the lower half, the recti muscles coming nearer and nearer together, as they descend from the navel to the pubes. (*Scarpa, Traité des Hernies, p.* 333.)

The hernial sac of ruptures at the upper part of the linea alba may contain a noose of intestine, and a piece of the omentum, though in most cases, a portion of the latter membrane alone forms the contents. In some subjects, the linea alba is so disposed to give way, that several herniæ are observed to be formed successively in the interspace between the ensiform cartilage and the umbilicus.

"With respect to the small hernia (says Scarpa,) which is considered as formed by the stomach, and concerning which Hoin and Garengeot have written so much (without either of them having related, at least to my knowledge, a single example proved by dissection,) it is at least unproved, that it was exclusively formed by this viscus. I do not see, why the other viscera, particularly the omentum and transverse colon, might not also contribute to it. In my judgment, it only differs from other herniæ of the linea alba, in being situated on the left side of the ensiform cartilage, a situation that must materially influence the symptoms of the case. In fact, whatever may be the viscera, which form it, a sympathetic irritation of the stomach is occasioned, that is much more intense, than that which ordinarily accompanies umbilical herniæ, those of the lower part of the linea alba, or, in short, all other herniæ, which are more remote from the stomach." (*Op. cit. p.* 334.)

The following are said to be the circumstances, by which the umbilical hernia, and that which occurs in the linea alba near the navel, may be discriminated.

The first, whether in the infant or the adult, has a roundish neck or pedicle, at the circumference of which the aponeurotic edge of the umbilical ring can be felt. Whatever may be its size, its body always retains nearly a spherical shape. Neither at its apex, or its sides, is any wrinkling of the skin, or any thing like the cicatrix of the navel, distinguishable. In some points of the surface of the tumour, the skin is merely somewhat paler and thinner, than elsewhere.

On the contrary, the hernia of the linea alba has a neck, or pedicle, of an oval form, like the fissure through which it is protruded. The body of the tumour is also constantly oval. If the finger be pressed deeply round its neck, the edges of the opening in the linea alba can be felt; and, if the hernia be situated very near the umbilical ring, the cicatrix of the navel may be observed upon one side of it, which cicatrix retains its rugosity, and all its natural appearance; a certain indication, that the viscera are not protruded through the umbilical ring. (*Scarpa, Traité des Hernies, p.* 336.)

The distinction which Scarpa has established between the umbilical herniæ, properly so called, and those of the linea alba, is not useless in regard to practice. Indeed, when the latter are left to themselves, they make much slower progress, than the former. On account of their smallness, they frequently escape notice, particularly in fat persons, and, when situated at the side of the ensiform cartilage. They occasion, however, complaints of the stomach, habitual colics, especially after meals; and, unfortunately for the patient, he may be tormented a very long time by these indispositions, before the true cause of them is discovered.

The umbilical hernia may be known, from the earliest period of its formation, by the alteration which it produces in the cicatrix of the navel, and the rapidity of its increase.

In other respects, these two kinds of herniæ demand the same means of cure; but those of the linea alba, *cæteris paribus*, are more difficult to cure, than ruptures at the umbilicus. This is probably owing to the natural tendency, which the umbilicial ring has to close, when the hernia is kept well reduced, whilst accidental openings in the linea alba have not the same advantage. (*Scarpa, p.* 340.)

When a common ventral hernia is reduced, it should be kept in its place by means of a bandage or truss. When strangulated, it admits, more frequently than most other cases, of being relieved by medical treatment. If attended with stricture, which cannot otherwise be relieved, that stricture must be carefully divided. Mr. A. Cooper recommends the valvular incision, and the dilatation to be made, either upward or downward, according to the relative situation of the tumour and epigastric artery, which crosses the lower part of the linea semilunaris.

Pudendal Hernia.—This is the name assigned by Mr. A. Cooper, to the hernia which descends between the vagina and ramus ischii, and forms an oblong tumour in the labium, traceable within the pelvis, as far as the os uteri. He thinks, that this case has sometimes been mistaken for a hernia of the foramen ovale. When reducible, a common female bandage, or the truss used for a prolapsus ani, should be worn. A pessary, unless very large, could not well keep the parts from descending, as the protrusion happens so far from the vagina. Mr. A. Cooper is of opinion, that, when strangulated, this hernia, in consequence of the yielding nature of the parts, may generally be reduced, by pressing them with gentle and regular force, against the inner side of the branch of the ischium. If not, the warm bath, bleeding, and tobacco clysters are advised. Were an operation indispensable, the incision should be made in the labium, the lower part of the sac carefully opened, and, with a concealed bistoury, directed by the finger, in the vagina, the stricture should be cut directly inward, towards the vagina. The bladder should be emptied, both before the manual attempts at reduction and the operation. (*On Crural Hernia, &c. p.* 64.)

Vaginal Hernia.—A tumour occurs within the os externum. It is elastic, but not painful. When compressed, it readily recedes, but is reproduced by coughing, or even without it when the pressure is removed. The inconveniences produced are an inability to undergo much exercise or exertion; for, every effort of this sort brings on a sense of bearing down. The vaginal hernia protrudes in the space, left between the uterus and rectum. This space is bounded below by the peritonæum, which membrane is forced downwards towards the perinæum; but, being unable to protrude further in that direction, is pushed towards the back part of the vagina. In one case Mr. A. Cooper advised the use of a pessary, but the plan was neglected. Probably, these cases are always intestinal.

Some herniæ protrude at the anterior part of the vagina. (*A. Cooper on Crural Hernia, &c. p.* 65, 66.)

Perinæal Hernia.—In men, the parts protrude between the bladder and rectum; in women, between the rectum and vagina. The hernia does not project, so as to form an external tumour, and, in men, its existence can only be distinguished by examining in the rectum. In women, it may be detected both from this part, and the vagina.

In case of strangulation, perhaps, this hernia might be reduced by pressure from within the rectum. An interesting case of perinæal hernia, which took place from the peritonæum being wounded with the gorget in lithotomy, is related by Mr. Bromfield; *Chirurgical Obs. p.* 264.

The reducible perinæal hernia in women may be kept from descending, by means of a large pessary. Both this kind of rupture and the vaginal may prove very dangerous in cases of pregnancy. (See *Smellie's Midwifery, Case* 5.)

Thyroideal Hernia, or *Hernia Foraminis Ovale.* In the anterior and upper part of the obturator ligament, there is an opening, through which the obturator artery, vein, and nerve proceed, and through which, occasionally, a piece of omentum, or intestine is protruded, covered with a part of the peritonæum, which constitutes the hernial sac.

In the case which Mr. A. Cooper met with, the hernia descended above the obturatores muscles. The os pubis was in front of the neck of the sac; three-fourths of it were surrounded by the obturator ligament; and the fundus of the sac lay beneath the pectineus and adductor brevis muscles. The obturator nerve and artery were situated behind the neck of the sac, a little towards its inner side. This species of hernia can only form an outward tumour, when very large. Garengeot, however, met with an instance, in which there was not only a swelling, but, one attended with symptoms of strangulation: he reduced the hernia, which went up with a guggling noise; the symptoms were stopped, and stools soon followed.

The hernia of the foramen ovale, when reducible, must be kept up with a suitable truss; and if it were strangulated, and not capable of relief from the usual means, an operation would be requisite, though attended with difficulties. The division of the obturator ligament and mouth of the sac should be made inwards, to avoid the obturator artery. If this vessel, however, were to arise in common with the epigastric artery, it would be exposed to injury by following this plan. (See *Garengeot in Mém. de l'Acad. de Chir. T.* 1; *A. Cooper on Crural Hernia, &c. p.* 70; *and First Lines of Surgery, Vol.* 2, *p.* 80, *&c.*)

Cystocele.—As Mr. Pott observes, "The urinary bladder is also liable to be thrust forth from its proper situation, either through the opening in the oblique muscle, like the inguinal hernia, or under Poupart's ligament, in the same manner as the femoral.

"This is not a very frequent species of hernia, but does happen, and has as plain and determined a character, as any other.

"It has been mentioned by Bartholin, T. Dom. Sala, Platerus, Bonetus, Ruysch, Petit, Mery, Verdier, &c. In one of the histories given by the latter, the urachus, and impervious umbilical artery on the left side, were drawn through the tendon into the scrotum, with the bladder; in another he found four calculi.

"Ruysch gives an account of one complicated with a mortified bubonocele. Petit says, he felt several calculi in one, which were afterward discharged through the urethra. (See also *J. G. F. Jahn de insolitâ Calculi Ingentis per Scrotum exclusione. Wittenberg*, 1750.)

"Bartholin speaks of T. Dom. Sala as the first discoverer of the disease, and quotes a case from him, in which the patient had all the symptoms of a stone in his bladder; the stone could never be felt by the *sound*, but was found in the bladder (which had passed into the groin) after death.

"As the bladder is only covered in part by the peritonæum, and must insinuate itself between that membrane and the oblique muscle, in order to pass the opening in the tendon, it is plain that the hernia cystica can have no sac, and that when complicated with a bubonocele, that portion of the bladder which forms the cystic hernia must lie between the intestinal hernia and the spermatic cord, that is, the intestinal hernia must be anterior to the cystic.

"A cystic hernia may, indeed, be the cause of an intestinal one; for when so much of the bladder has passed the ring, as to drag in the upper and hinder part of it, the peritonæum which covers that part must follow, and by that means a sac be formed for the reception of a portion of gut or caul. Hence the different situation of the two herniæ in the same subject.

"While recent, this kind of hernia is easily reducible, and may, like the others, be kept within by a proper bandage; but when it is of any date, or has arrived to any considerable size, the urine cannot be discharged, without lifting up, and compressing the scrotum; the outer surface of the bladder is now become adherent to the cellular membrane, and the patient must be contented with a suspensory bag.

"In case of complication with a bubonocele, if the operation becomes necessary, great care must be taken not to open the bladder instead of the sac, to which it will always be found to be posterior. And it may also sometimes by the inattentive be mistaken for a hydrocele, and by being treated as such, may be the occasion of great or even fatal mischief." (*Vol.* 2.)

The cystocele is always easily distinguishable by the regular diminution of the swelling, whenever the patient makes water.

Verdier and Sharp have accurately described the cystocle. Pott has offered two cases, which fell under his observation; *Vol.* 3. Pipelet le Jeune mentions a cystic hernia in perinæo, and several cases of its occurrence in the female; *Acad. de Chir. T.* 4. Pott cut into one cystocele, by mistake. Mention is made (*Edinb. Surg. Jour. Vol.* 4, *p.* 512.) of a cystic hernia, which protruded between the origins of the levator ani, and obturator internus muscles: the tumour made its appearance in the pudendum of an old woman. Much additional information respecting the cystocele, and its various forms, is contained in the second volume of the *First Lines of Surgery, p.* 49, *&c.*, accompanied with references to all the most interesting writers on the subject. An instance of protrusion of the bladder through a wound, caused by a bullock's horn, is recorded by Larrey. (*Mém. de Chir. Mil. T.* 4, *p.* 289.)

Ischiatic Hernia.—This disease is very rare. A case, however, which was strangulated, and undiscovered till after death, is related in Mr. A. Cooper's second part of his work on hernia. It was communicated by Dr. Jones, so celebrated for his book on hemorrhage. The disease happened in a young man, aged 27. On opening the abdomen, the ileum was found to have descended on the right side of the rectum into the pelvis, and a fold of it was protruded into a small sac, which passed out of the pelvis at the ischiatic notch. The intestine was adherent to the sac at two points: the strangulated part, and about three inches on each side, were very black. The intestines towards the stomach were very much distended with air, and here and there, had a livid spot on them. A dark spot was even found on the stomach itself just above the pylorus. The colon was exceedingly contracted as far as its sigmoid flexure. A small orifice was found in the side of the pelvis, in front of, but a little above the sciatic nerve, and on the forepart of the pyriformis muscle. The sac lay under the glutæus maximus muscle, and its orifice was before the internal iliac artery, below the obturator artery, but above the vein. Mr. A. Cooper remarks, that a reducible case might be kept up with a spring truss, and that if an operation were requisite, the orifice of the sac should be dilated directly forwards. (*On Crural Hernia, &c. p.* 73.) For a further account of the ischiatic hernia, and references to the most interesting works on the subject, see *First Lines of Surgery, Vol.* 2, *p.* 84, *&c.*

Phrenic Hernia.—The abdominal viscera are occasionally protruded through the diaphragm, either through some of the natural apertures in this muscle, or deficiencies, or wounds, and lacerations in it. The second kind of case is the most frequent: Morgagni furnishes an instance of the first. Two cases, related by Dr. Macauley in *Med. Obs. and Inq. Vol.* 1, two more detailed in the *Medical Records and Researches*, and two others published by Mr. A. Cooper, are instances of the second sort: and another case has been lately recorded by the latter gentleman, affording an example of the third kind. A laceration of the diaphragm by fractured ribs, has produced a hernia. A case of this kind was dissected by Mr. Travers, at Guy's Hospital. (*Med. Chir. Trans. Vol.* 6, *p.* 375.) In this last volume, may also be found the particulars of an interesting example, in which a considerable part of the large curvature of the stomach was protruded through a fissure of the diaphragm. The accident was unattended with any fracture of the ribs, and was caused by the upsetting of a stage coach, on which the patient was an outside passenger. Before death, he vomited up a large quantity of blood, and a small semicircular aperture was discovered on dissection in the lower part of the strangulated portion of the stomach. (*P.* 378, 379.) See also *B. Stehelin, Tentamen Med. quod ventriculum, qui in thoracem migraverat, &c. describit,* 1721; (*in Hallerii Disp. Anat.* 6, 675.) Hildanus, Paré, Petit, Schenck, &c. also mention cases of phrenic hernia. The disease is quite out of the reach of art.

Mesenteric Hernia.—If one of the layers of the mesentery be torn by a blow, while the other remains in its natural state, the intestines may insinuate themselves into the aperture, and form a kind of hernia. The same consequence may result from a natural deficiency in one of these layers. Mr. A. Cooper records a case, in which all the small intestines, except the duodenum, were thus circumstanced. The symptoms during life were unknown. (*On Crural Hernia, &c. p.* 82.)

Mesocolic Hernia.—So named by Mr. A. Cooper, when the bowels glide between the layers of the mesocolon. A specimen of this disease is preserved at St. Thomas's Hospital.

Every surgeon should be aware, that the intestines may be strangulated within the abdomen from the following causes: 1. Apertures in the omentum, mesentery, or mesocolon, through which the intestine protrudes. 2. Adhesions, leaving an aperture, in which a piece of intestine becomes confined 3. Membranous bands at the mouths of hernial sacs, which becoming elongated, by the frequent protrusion and return of the viscera, surround the intestine, so as to strangulate them within the abdomen, when returned from the sac. (See *A. Cooper on Crural Hernia, &c. p.* 85.)

Pott remarks, that "Ruysch gives an account of an impregnated uterus being found on the outside of the abdominal opening; and so do Hildanus and Sennertus. Ruysch also gives an account of an entire spleen having passed the tendon of the oblique muscle. And I have myself seen the ovaria removed by incision, after they had been some months in the groin." (*Vol.* 2.) More particulars respecting all the less frequent kinds of hernia are given in the second volume of the *First Lines of Surgery. Franco, Traité des Hernies, &c.* 8*vo., Lyon,* 1561; *Lud. von Hammen, De Herniis,* 12*mo., Lugd.* 1581. *Malach-Geiger, Kelegraphia, sive Descriptio Herniarum, cum earundem curationibus, tam Medicis, quam Chirurgicis,* 12*mo., Monachii,* 1631; *Ant. 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HERNIA CEREBRI (*Fungus Cerebri. Encephalocele.*) There are two principal kinds of hernia cerebri: one presents itself in young infants, before the ossification of the skull is completed ; the other takes place after the destruction of a part of the skull by the operation of the trephine, accidental violence, or disease.

The congenital hernia cerebri of infants occurs, however, in two very different forms ; in one it is covered by the scalp ; in the other, the corresponding integuments of the head, and sometimes even the dura mater, are deficient.

The common encephalocele, met with in new-born children, seems to originate from the imperfect ossification of the skull, especially in the situation of the fontanella, and sutures. This case is characterized by a soft swelling, of an equal round shape, which is attended with a pulsation corresponding to that of the pulse ; it yields and disappears under pressure, offers no alteration in the colour of the skin, and is circumscribed by the margin of the defective portion of the skull. (*Ferrand, in Mém. de l'Acad. de Chir. T.* 13, *in* 12*mo. p.* 102.) In general, the mental faculties are not affected ; and we read of one example, in which a patient had such a hernia cerebri thirty-three years, without his intellects ever having been impaired during the whole of that period. (*Op. cit. T.* 5, *in* 4*to. p.* 863.)

It is tolerably well established, that the congenital hernia cerebri, which arises from the incomplete ossification of the skull, and is covered by the scalp, ought to be treated by the application of constant, yet moderate pressure. M. Salleneuve communicated to the Royal Academy of Surgery in France an example of the good effects of this treatment, which reduces the size of the tumour, and accomplishes a perfect cure as soon as the ossification is completed. M. Salleneuve put a piece of thin sheet lead, properly covered with soft linen, under the child's cap, to which it was sewed in a suitable situation, and the degree of pressure was increased, or lessened, according as circumstances required, by tightening, or loosening the cap. (*Op. cit. p.* 103, *T.* 13, *Edit.* 12*mo.*)

The experience of Callisen also confirms, that hernia cerebri, when of moderate size, may be cured by the foregoing method, the aperture becoming gradually closed. But he adds, that large tumours of this description, especially when situated about the occiput, scarcely admit of any means of relief, except the employment of some contrivance to protect them from external injury. (*Callisen, System. Chir. Hodiernæ, Vol.* 2, *p.* 513, 514. *Ed.* 1800.)

When the ossification of the sutures in children is late, the cerebellum, as well as the cerebrum, is liable to protrusion. In 1813, two such cases occurred at Paris. In one, Professor Lallement mistook the disease for a common tumour, and commenced an operation for its removal, when, after making some of the necessary incisions, his proceedings were stopped by his seeing the white silvery colour of the dura mater, and that the swelling came out of an aperture in the occipital bone. The day after the operation the child was seized with violent pain in the head, had a hard pulse, prostration of strength, vomiting, &c. and died in the course of a week. On dissection, a part of the tentorium, and an elongation of the two lobes of the cerebellum, about as large as a nut, were found in the protruded sac of the dura mater. Several abscesses were also discovered in the substance of the cerebellum. The other example fell under the observation of M. Baffos, principal surgeon to the Hôpital des Enfans. Upon the death of the child, the dissection evinced similar appearances. (*Richerand, Nosographie Chir. T.* 2, *p.* 319, *Ed.* 4.)

Such facts should teach the surgeon to be particularly cautious in ascertaining the nature of tumours about the back part of the head, before he ventures to attempt their removal.

The second kind of congenital encephalocele is that, in which not only large portions of the cranium, but also more or less of the integuments of the head, are deficient. It is rather to be regarded as a malformation than a disease, and, indeed, in most instances, the infants are still-born. The case sometimes consists of the protrusion of most of the brain through the inferior and posterior fontanellæ, so that the child is born with a largish bag, on the back of its head, hanging down over the posterior part of the neck. Several specimens of these malformations, taken from infants born in the Hospice de la Maternité, are preserved in the Museum of the Faculté de Médecine at Paris. (*Richerand, Nosogr. Chir. T.* 2, *p.* 316, *Edit.* 4.) In the year 1810, a remarkable case of this last description of congenital hernia cerebri was published by Dr. Burrows. "The whole of the forehead, summit, and a great part of the occiput, were deficient, and in lieu of them, a substance projected of a light mulberry colour, and of the mushroom form, except that it was proportionably broader. From the deficiency of bone, the eyes appeared to project much more than usual.—The child lived six days without either taking sustenance, or having any evacuation." On dissection, the scalp, the os frontis, the parietal, and a great part of the occipital bones, were wanting. Through the parts, at which these bones were deficient, the cerebrum projected, exhibiting its usual convolutions. It was covered with the pia mater; was of a mulberry colour; appeared to be more vascular than the pia mater usually is; and the edge of the scalp adhered to the neck of the tumour. The cerebellum was not more than one-fourth of its usual size; for, the posterior part of the os occipitis was much nearer to the sella turcica than natural. The child was destitute of the power of voluntary motion, and all the secretions appeared to be stopped. (See *Med. Chir. Trans. Vol.* 2, *p.* 52.)

The most interesting species of hernia cerebri to the practitioner, is that which sometimes arises after the removal of a portion of the skull by the trephine, or the destruction of part of it by disease. Various examples of this disease are recorded in the Memoirs of the French Academy of Surgery, and I have myself seen many instances of it. Although the case has attracted considerable notice, modern surgeons are far from entertaining settled opinions concerning the exact nature of the tumour.

In one example, recorded by Mr. Abernethy, the hernia cerebri arose on the tenth day after trephining, and was as large as a pigeon's egg. The pia mater, covering it, was inflamed; and a turbid serum was discharged at the sides of the swelling, from beneath the dura mater. On the eleventh day, the tumour was as large as a hen's egg, smooth, and ready to burst. The man died the next day. On examination, the swelling was found still larger, and of a dark colour, with an irregular granulated surface. This appearance was owing to coagulated blood, which adhered to its surface, as the part had bled so much, that the patient's cap was rendered quite stiff with blood. The pia mater was in general much inflamed, and, as well as the dura mater, was deficient at the place of the tumour. The deeper part of the swelling seemed to consist of fibrous coagulated blood, and it was found to originate about an inch below the surface of the brain.

Mr. Abernethy explains the formation of

the disease, as follows: "In consequence of the brain being injured to some depth beneath the surface, disease of the vessels, and consequent effusion of the blood, had ensued; the effusion was for a time restrained by the superincumbent brain and its membranes; but, these gradually yielding to the expansive force exerted from within, and at last giving way altogether, the fluid blood oozed out and congealed upon the surface of the tumour." An organized fungus can hardly be produced so rapidly as these tumours are formed. (*On Injuries of the Head, in Surgical Works, Vol. 2. p.* 53.)

On the contrary, Mr. C. Bell declares, that the swelling is vascular and organized. (*Operative Surgery, Vol.* 1.)

Dr. John Thomson also entertains a different opinion from that of Mr. Abernethy, respecting the mode in which these herniæ cerebri are formed; but I question whether he may not have confounded with the disease now under consideration, fungous tumours of the dura mater. At least, some of the cases to which he alludes, as a reason for his sentiment concerning their mode of formation, must have been the disease so well described by M. Louis. (See *Dura Mater.*) The reader, however, must judge for himself from the following passage: "In a considerable number of those who had the cranium severely contused, or fractured by musket-balls, (says Dr. Thomson) fungous growths took place through the openings, which had been made at first by the ball or afterward by the trepan. These growths, I am inclined to believe, are the consequence of a contusion of the substance of the brain and of the membranes that cover it, which gives rise to the formation of a new organized substance, different in its texture from brain, and are not, as some late writers would endeavour to persuade us, simply protrusions of the brain, resulting from the removal of the natural resistance, which is made to them by the dura mater and cranium. *I have known instances of substances, similar to these growths, forming on the surface of the brain, immediately under the place, where the cranium had received a contusion, in cases in which the trepan had not been applied, or any portion of the cranium removed.*

"Fungus of the brain, in the greater number of instances, in which we had an opportunity of observing it, was accompanied either with stupor or paralysis, and other symptoms of compressed brain. In a fracture of the vertex of the cranium, produced by a musket-ball, and followed by a fungus of the brain, the paralysis took place in the lower extremities. In a case of wound, made by a musket-ball on the right side of the forehead, and in which spiculæ of bone had been driven in upon the brain, a large fungus protruded. The formation of this fungus was followed by slow pulse, stupor, dilated pupils; slight strabismus, and distortion of the mouth. In the progress of this case, escharotics were applied to the fungus, portions of it were torn off by the patient, and all of it that was exterior to the cranium, was twice pared off by the knife, with an apparent alleviation, rather than aggravation, of the symptoms. On the death of this patient, nearly the whole of the right hemisphere of the brain was found converted into a soft pulpy mass. The left hemisphere was not changed in structure, though much vascular turgescence appeared on its surface." (See *Dr. J. Thomson's Report of Observations made in the Military Hospitals in Belgium, p.* 57, 58.)

From the investigations of Mr. Stanley, the fact is placed beyond all doubt, that a part of the brain occasionally constitutes the substance of herniæ cerebri; and he thus confirms the opinion formerly entertained upon this point by Quesnay and Louis. Thus, in the first case which Mr. Stanley has recorded, "the whole tumour was sliced off with a scalpel. During the operation, the boy gave no manifestation of positive pain, although not unconscious of what we were doing. Considerable hemorrhage took place from the surface of the brain, exposed by the removal of the tumour, the blood being thrown with great force, and to a considerable distance from numerous vessels, which were attempted to be secured, but ineffectually, by ligatures. After a short time, however, the bleeding ceased. On examination of the part, which had been cut off, its exterior was found to consist merely of a layer of the coagulated blood; the rest of the mass was brain, possessing a natural appearance, the distinction between the cortical and medullary matter being readily seen, with the convolutions and pia mater dipping down between them." In the dissection, after death, "all that part of the dura mater, adjacent to the ulcerated aperture, through which the brain had protruded, was black, sloughy, and much thickened. The exposed surface of the brain, from which the portion had been cut off, exhibited a softened and broken down texture, a state of disorganization, which extended deep into its substance. About an ounce of fetid and dark-coloured fluid was found between the dura mater and arachnoid membrane. Several small effusions of blood were met with, both between the membranes and in the substance of the brain. The arachnoid membrane was thickened and opaque over each hemisphere. The vessels on the surface, and in the substance of the brain, were remarkably free from blood. The lateral ventricles were large, and filled with transparent fluid, and there was some found between the membranes at the basis, so that, altogether the quantity from these two sources was very considerable." (See *Med. Chir. Trans. Vol.* 8, *p.* 15—17.) In another dissection, a considerable quantity of pus was found on the arachnoid membrane, on each side of the falx. (*P.* 27.) In most of the cases of hernia cerebri, which I have seen, the patient was at first more or less sensible, but labouring under considerable nervous agitation. The stupor, paralysis, and other symptoms of compressed brain, noticed by Dr. J. Thomson, did not take place, till the latter stage of the disease, and then convulsive twitches of the muscles and strabismus occasionally came on. (See *Med. Chir. Trans. p.* 26.) The disease is usually attended with great frequency of the pulse.

With regard to the cause of the protrusion, it is a subject very difficult of explanation, because, if the origin of the tumour depended simply on the removal of a portion of the skull, or on any changes of the dimensions of the brain in expiration, the effect would always follow such causes, and prevail in all patients. From the particulars of the dissections, performed by Mr. Abernethy and Mr. Stanley, and those referred to by Dr. Thomson, it is clear, that the hernia cerebri is a disease connected with deep-seated changes throughout a great part of the brain. (See also *Larrey, Mem. de Chir. Mal. T.* 4, *p.* 206.) The substance of this organ is found more or less pulpy and disorganized; and, after death, large effusions of serum, and even sometimes of blood, and purulent matter, are observed. These appearances leave no doubt of the disease being associated with inflammatory action within the head. It is highly probable, therefore, that a hernia cerebri is only produced when these deep-seated changes are conjoined with the removal of bone. The changes alluded to, may be supposed to cause an increase in the general contents of the skull, and thus a disposition to protusion, as rapid as the serum and other fluids are effused. This statement, however, can only be received as an hypothesis, because we find, that in one of the dissections, described by Mr. Stanley, "there existed a considerable space between the upper surface of the right hemisphere, all around the situation of the protrusion and the internal surface of the dura mater, while in every other part, the brain and dura mater were in close contact." (See *Med. Chir. Trans. Vol.* 8. *p.* 27.) Now, the idea of an empty space within the cranium is rather inconsistent with the supposition, that the brain is thrust out, in consequence of changes, which augment the quantity of the general contents of the skull, unless such space were filled with air, that had no external communication.

When the bad symptoms disappear, on the tumour being no longer confined by the dura mater, some practitioners deem it best to interfere as little as possible, and let the tumour drop off in pieces. (See *Edinb. Med. Comment. Vol.* 1, *p.* 98. *Med. Museum, Vol.* 4, *p.* 463.) The mildest dressings are to be employed; but whether the protrusion should be resisted by pressure, or not, seems unsettled.

When the tumour acquires a very great size it may be pared off with a knife, as was done by Mr. Hill, in several instances with success. (*Cases in Surgery,* 8*vo. Edinb.* 1772.)

In one of the cases, published by Mr. Stanley, the patient, a boy about eleven years of age, recovered after the upper part of the tumour had been pared off, and some of the removed substance found to consist decidedly both of cortical and medullary substance. In this instance, the reproduction of the tumour was checked by firm pressure with graduated compresses, and a bandage. The protruded brain gradually lost its natural colour; it acquired a light yellow appearance, was split into several portions, and a very fetid odour exhaled from it. Its substance daily became softer, ultimately acquiring almost a semi-fluid state, and in this condition the whole mass gradually wasted away. *Fresh granulations arose to fill up the vacancy, and they were manifestly produced from the exposed substance of the brain.* Compression being continued, the part now quickly healed up. (See *Med. Chir. Trans. p.* 20, 21.) In a third case, the part of the tumour cut off, consisted entirely of cortical and medullary substance, quite healthy in its appearance (*p.* 24;) and subsequently granulations were formed from the exposed surface of the brain. The case, however, had a fatal termination. By the removal of the swelling, and the use of compression, one cure was effected by Mr. Pring. (See *Edinb. Med. and Surgical Journ. Vol.* 9.)

Richerand affirms, indeed, generally, that when the brain is exposed, in consequence of an injury of the head, the encephalocele should be cut down with a knife, and repressed by gentle compression. (See *Nosogr. Chir. T.* 2, *p.* 318, *Ed.* 4.)

The cases published by Mr. Stanley are rather favourable to the employment of pressure, inasmuch as it appeared evidently to check the protrusion, and was mostly borne without inconvenience.

The idea, however, that when the brain protrudes through the dura mater, pressure can effect its return, is, as Mr. Stanley judiciously observes, quite untenable. (*Med. Chir. Trans. Vol.* 8, *p.* 36.)

Quesnay mentions an instance, in which a patient tore off the protruded mass himself, and the cavity healed up. (*Mém. de l'Acad. de Chir. T.* 1.) Van Swieten relates a case, in which the swelling was repeatedly removed with a ligature, and a cure ensued. (*Comment. T.* 1. *p.* 440.) The danger of applying styptics, and irritating applications, is shown by Hildanus, *Obs.* 14, and Mr. Hill, *p.* 198.

Baron Larrey considers the treatment by excision, pressure, and spirituous applications, hurtful and dangerous: his advice is merely to apply to the swelling a pledget of slightly camphorated oil of camomile; to have recourse to cooling aperient beverages; to remove all kinds of irritation; to exclude the air; and apply the dressings with great gentleness. By these means, the only case which Larrey ever saw recover, was saved, and in it the tumour was small. (*Mém. de Chir. Mil. T.* 4. *p.* 206.)

One would suppose, that cases of this kind must generally require the employment of every thing at all likely to keep off, and diminish inflammation of the brain. *Quesnay, sur la Multiplicité des Trépans, in Mém. de l'Acad. Royale de Chirurgie, T.* 2, *p.* 25, 56, *Ed. in* 12*mo. M. Corvin's Dissert, in Haller's Disputat. Chir. Vol.* 2. *Mémoire sur l'Encephalocele par M. Ferrand, in Mém. de l'Acad. de Chir. T.* 13, *p.* 96, *Edit.* 12*mo. Lassus, Pa-*

thologie Chirurgicale, T. 2, *p.* 140, *Edit.* 1809. *Abernethy's Essay on Injuries of the Head. Hill's Cases in Surgery. Burrows in Med. Chir. Trans. Vol.* 2. *Callisen, Systema Chirurgiæ Hodiernæ, Vol.* 2, *p.* 512, *Ed.* 1800. *C. Bell's Operative Surgery, Vol.* 1. *Richter's Ansfangsgründe der Wundarzneykunst, B.* 2, *p.* 197, *Ed.* 1802. *Richerand, Nosographie Chir. T.* 2, *p.* 316, *Edit.* 4, *Paris,* 1815. *Dr. J. Thomson's Report of Observations made in the Military Hospitals in Belgium, p.* 57, *Edinb.* 1816. *Delpech, Précis Elémentaire des Maladies Chirurgicales, T.* 2, *p.* 447, *et seq. Paris,* 1816. *Crell and Sand, in Haller's Disput. Chir. T.* 1. *E. Stanley, in Med. Chir. Trans. Vol.* 8; *a paper, containing many valuable observations. Larrey, in Mém. de Chir. Mil. T.* 4, *p.* 203, *&c. Hennen's Military Surgery, p.* 311, *&c. Ed.* 2. *A. Solomons, De Cerebri Tumoribus, Edinb.* 1810. *J. L. Schoenlein, Von der Hirnmetamorphose, 8vo. Würzb.* 1816.

HERNIA HUMORALIS. (*Swelled or inflamed Testicle.*) A very common symptom, attending a gonorrhœa, is a swelling of the testicle, which is only sympathetic, and not venereal, because the same symptoms follow every kind of irritation of the urethra, whether produced by strictures, injections, or bougies. Such symptoms are not similar to the actions arising from the application of venereal matter; for suppuration seldom occurs, and when it does, the matter is venereal. The swelling and inflammation appear suddenly, and as suddenly disappear, or go from one testicle to the other. The epididymis remains swelled, however, even for a considerable time afterward.

The first appearance of swelling is generally a soft pulpy fulness of the body of the testicle, which is tender to the touch; this increases to a hard swelling, accompanied with considerable pain. The epididymis, towards the lower end of the testicle, is generally the hardest part. The hardness and swelling, however, often pervade the whole of the epididymis. The spermatic cord, and especially the vas deferens, are often thickened and sore to the touch. The spermatic veins sometimes become varicose. A pain in the loins, and sense of weakness there, and in the pelvis, are other casual symptoms. Colicky pains; uneasiness in the stomach and bowels; flatulence; sickness; and even vomiting; are not unfrequent. The whole testicle is swelled, and not merely the epididymis, as has been asserted.

The inflammation of the part most probably arises from its sympathizing with the urethra. The swelling of the testicle coming on, either removes the pain in making water, and suspends the discharge, which do not return, till such swelling begins to subside; or else the irritation in the urethra, first ceasing, produces a swelling of the testicle, which continues till the pain and discharge return; thus rendering it doubtful, which is the cause, and which the effect. Occasionally, however, the discharge has become more violent, though the testicle has swelled; and such swelling has even been known to occur after the discharge has ceased; yet, the latter has returned with violence, and remained as long as the hernia humoralis. (*J. Hunter.*)

Irritation at the mouth of the vasa deferentia, has been mentioned as a cause; but were this true, both testicles would usually be affected at the same time, and the complaint would occur more frequently, when the irritation of the urethra extends far towards the bladder, than when it only reaches about an inch and a half, or two inches from the orifice of the passage.

Hernia humoralis, with stoppage of the discharge, is apt to be attended with strangury. It is singular, that the inflammation should more frequently come on when the irritation in the urethra is going off, than when it is at its height.

The enlargements of the testicle, from cancer and scrofula, are generally slow in their progress; that of a hernia humoralis very quick. (*J. Hunter.*)

Rest is the best remedy, and the horizontal position of the body is easiest. At all events, the testicle must be well suspended; to which expedient the patient will readily have recourse as soon as he knows the ease which it affords. The case is treated as inflammation in general, by bleeding and purging, and applying fomentations and poultices. In the hernia humoralis from gonorrhœa, however, cold applications are sometimes preferred. (*James on Inflammation, p.* 164.) Leeches have often proved serviceable. The swelling not being venereal, mercury is only useful in removing the induration, after the inflammation has subsided. Vomits have been recommended, and found beneficial. They have even been known to cure the complaint in a surprisingly sudden manner. Opiates are useful. When suppuration occurs, no mercury is requisite, only common treatment.

As the hernia humoralis often appears to depend on the cessation of the discharge, some (*Bromfield*) have advised irritating the urethra with bougies to bring on the gonorrhœa again; but the practice is not followed by the expected good. The introduction of venereal matter into the urethra has also been most absurdly suggested.

A hernia humoralis is at first very quick in subsiding; but some of the swelling remains a long while, and the hardness of the epididymis may even continue for years, nay, for life. However, no inconvenience attends the mere induration. In such instances, the vas deferens may occasionally be rendered impervious, though the occurrence must be by no means frequent.

Frictions with camphorated mercurial ointment; fumigations with aromatic herbs; and electricity; are the best means for dispersing the induration in question. (*J. Hunter.*)

The signs distinguishing a hernia humoralis from a scrotal rupture, are explained in the article *Hernia.*

I once had under my care a patient with hernia humoralis, whose symptoms were severe in an extraordinary degree, and strongly resembled those of a strangulated hernia, being attended with much sickness, and obstinate constipation. A swelling of the testis, accompanied with all the symptoms of strangulated hernia, is recorded by Guincourt. (See *Journ. de Méd. par Corvisart, T.* 16.)

Although I had never seen hernia humoralis attended with symptoms so much resembling those of strangulated rupture, as in the case which fell under my own notice, and the patient would not own that he had had any gonorrhœa, yet I remarked some circumstances, which made me avoid an erroneous judgment. In the first place, I could discover no protrusion from the abdominal ring. Secondly; I observed that there was no tension, nor swelling of the belly, as in common cases of strangulated ruptures. Thirdly, I remarked, that the inflammation of the scrotum did not increase as the symptoms advanced, as it usually does in the latter disease. Fourthly; I took notice that the pain in the belly was most severe under the false ribs on the right side, though at periods it was certainly very diffused; but it was never augmented by pressure, as always happens in strangulated hernia, peritonitis, enteritis, &c. from all which disorders too, the absence of tension seemed to distinguish it. Sometimes likewise, the pain was entirely in the tumour; sometimes altogether in the abdomen.

HERPES. (from ἑρπω, to creep.)

Nothing could be more confused, and undefined, than the idea conveyed by the term *herpes*, as generally employed by medical men before the last few years. In fact, numerous cutaneous diseases, of the most opposite kinds, but which had a tendency to creep, or spread slowly, were designated, as specimens of herpes. Thus, when I first entered the profession, it was common for some of the most eminent surgeons in London frequently to call noli me tangere, or lupus, herpes of the nose; and to apply the same term to tinea capitis, or the porrigo favosa.

Happily, this vague mode of regarding diseases of the skin is beginning to give way to the judicious distinctions proposed by the late Dr. Willan, and so ably perfected by Dr. Bateman. The appellation, *herpes*, is limited by these physicians "to a vesicular disease, which, in most of its forms, passes through a regular course of increase, maturation, and decline, and terminates in about ten, twelve, or fourteen days. The vesicles arise in distinct, but irregular clusters, which commonly appear in quick succession, and they are set near together, upon an inflamed base, which extends a little way beyond the margin of each cluster. The eruption is preceded, when it is extensive, by considerable constitutional disorder, and is accompanied with a sensation of heat and tingling, sometimes with severe deep-seated pain in the parts affected. The lymph of the vesicles, which is at first clear and colourless, becomes gradually milky and opaque, and ultimately concretes into scabs: but in some cases, a copious discharge of it takes place, and tedious ulcerations ensue. The disorder is not contagious in any of its forms." (See *Bateman's Practical Synopsis of Cutaneous Diseases, p.* 221, 222, *Edit.* 3) This author notices six species of the complaint: viz. herpes phlyctænodes; herpes zoster; herpes circinatus; herpes labialis; herpes præputialis; and herpes iris.

As most of these cases more properly belong to the physician, than surgeon, I shall briefly describe three of them.

According to Dr. Bateman, the *Herpes Zoster*, or *shingles*, is mostly preceded for two or three days, by languor, and loss of appetite, rigours, headach, sickness, and a frequent pulse, together with a scalding heat, and tingling in the skin, and shooting pains through the chest and epigastrium. Sometimes, however, the precursory febrile symptoms are very slight. Upon some part of the trunk, several red patches occur, of an irregular form, at a little distance from each other, upon each of which, numerous small elevations appear clustered together. These, if examined minutely, are found to be distinctly vesicular, and in the course of twenty-four hours, they enlarge to the size of small pearls, and are perfectly transparent, being filled with a limpid fluid. For three or four days, fresh clusters continue to arise, always extending themselves nearly in a line with the first, towards the spine at one end, and towards the linea alba at the other. While the new clusters are appearing, the visicles of the first lose their trasparency, and, on the fourth day, acquire a milky, or yellowish hue, which is soon followed by a bluish, or livid colour, of the bases of the vesicles, and of the contained fluid. They now become somewhat confluent, and flatten, or subside. About this time, they frequently break, and discharge for three or four days, a serous fluid, which, at length, concretes into thin dark scabs. These fall off about the twelfth or fourteenth day, leaving the surface of the subjacent skin in a red and tender state; and when the ulceration and discharge have been considerable, numerous cicatrices, or pits, are left. All the clusters go through a similar series of changes.

Young persons, from the age of twelve to twenty-five, are most frequently affected; although aged persons are not altogether exempt from the complaint, and suffer severely from the pain of it. Summer and autumn are the seasons, in which it is most common. Sometimes it supervenes to bowel complaints, and the chronic pains remaining after acute pulmonary diseases. In the treatment, Dr. Bateman thinks gentle laxatives, and diaphoretics, with occasional anodynes, when the severe deep-seated pains occur, all that is necessary. No external application is requisite, unless the vesicles be abraded by the friction of the clothes, which are then liable to adhere to the parts: in this case, a little simple ointment may be interposed. For a fuller account, see *Bateman's Pract. Synopsis, p.* 226, &c.

Herpes circinatus, or *ringworm*, makes its appearance in small circular patches, in which the vesicles arise only round the circumference; these are small, with moderately red bases, and contain a transparent fluid, which is discharged in three or four days, when little prominent dark scabs form over them. The central area, in each vesicular ring, is at first free from any eruption; but the surface becomes somewhat rough, and of a dull red colour, and throws off an exfoliation, as the vesicular eruption declines, which terminates in about a week, with a falling off of the scabs. A succession of these vesicular circles usually arise on the face and neck, or arms and shoulders, thus protracting the case for two or three weeks.

The itching and tingling, which are the only inconveniences of the affection, may be relieved by the application of the popular remedy ink, solutions of the salts of iron, copper, zinc, borax, alum, &c. Some additional interesting observations on other forms of the herpes circinatus, may be found in Dr. Bateman's Synopsis, from which I have extracted the few preceding particulars.

Herpes Præputialis. This local variety of herpes was not noticed by Dr. Willan, and we are indebted to Dr. Bateman for a description of it. The complaint begins with extreme itching, and with some sense of heat in the prepuce, on which one or two red patches occur, about the size of a silver penny. Upon these are clustered five or six minute transparent vesicles. In twenty-four or thirty hours, the vesicles enlarge, become of a milky hue, and lose their transparency; and on the third day, they are coherent, and have almost a pustular appearance. If the eruption is seated on that surface of the prepuce, which is next the glans, so that the vesicles are kept moist, they commonly break about the fourth or fifth day, and form a small ulceration upon each patch. This discharges a little turbid serum, and has a white base, with a slight elevation at the edges; and by an inaccurate, or inexperienced observer, it may be readily mistaken for chancre, more especially, if any escharotic has been applied, which produces irritation, and a deep-seated hardness, like that of a true chancre. If not irritated, the slight ulceration begins to heal about the ninth or tenth day. When the patches occur on the outside of the prepuce, the duration of the eruption is shorter, and ulceration does not actually take place.

In the treatment, Dr. Bateman recommends the avoidance of all stimulating, and moist, or unctuous applications; and if the complaint be within the prepuce, he advises the interposition of a little bit of dry lint between the sore and the glans.

As this gentleman has truly remarked, this case is particularly deserving of notice, because it has often been considered and treated as a chancre.

For a great deal more valuable information respecting Herpes, I beg leave to refer the reader to the publications of Drs. Willan and Bateman, and also to the article *Herpes*, written by this last able physician for Dr. Rees's Cyclopædia.

HORDEOLUM. (dim of *hordeum*, barley.) A little tumour on the eyelid, resembling a barley corn. *A Stye.* As Scarpa remarks, the stye is strictly only a little boil which projects from the edge of the eyelids, particularly often near the great angle of the eye. This little tumour, like the furunculus, is of a dark-red colour, much inflamed, and a great deal more painful than might be expected, considering its small size. The latter circumstance is partly owing to the vehemence of the inflammation producing the stye, and partly to the exquisite sensibility and tension of the skin which covers the edge of the eyelids. On this account, the hordeolum very often excites fever and restlessness in delicate, irritable constitutions; it suppurates slowly and imperfectly; and, when suppurated, has no tendency to burst.

The stye, like other furunculous inflammations, forms an exception to the general rule, that the best mode, in which inflammatory swellings can end, is resolution. For, whenever a furunculous inflammation extends so deeply as to destroy any of the cellular substance, the little tumour can never be resolved, or only imperfectly so. This event, indeed, would rather be hurtful, since there would still remain behind a greater or smaller portion of dead cellular membrane; which, sooner or later, might bring on a renewal of the stye in the same place as before, or else become converted into a hard indolent body, deforming the edge of the eyelid.

The resolution of the incipient hordeolum may be effected in that stage of it, in which the inflammation only interests the skin, and not the cellular substance underneath, as is the case on the first appearance of the disease. Now repellent, cold applications are useful, particularly ice. But when the hordeolum has affected and destroyed any of the cellular membrane underneath, every topical repellent application is absolutely useless, and even hurtful; and the patient should have recourse to emollient anodyne remedies. The hordeolum and eyelids should be covered with a warm soft bread and milk poultice, which ought to be renewed very often. When a white point makes its appearance on the apex of the little tumour, Scarpa says, the surgeon should not be in a hurry to let out the small quantity of serous matter which exists between the skin and dead portion of cellular membrane. It is better that he should wait till the skin within this white point has become still somewhat thinner, so as to burst of itself, and give a ready vent, not merely to the little serous matter, but to all the dead cellular membrane which constitutes the chief part of the disease. When the contents of the little tumour are slow in making their way outward, through the opening, the surgeon, gently compressing the base of the stye, ought to force them out. After this, all the symptoms of the disease will disappear, and the cavity, left by the dead cellular membrane, in the centre of the little tumour, will be found quite filled up and healed in the course of twenty-four hours.

Sometimes, though seldom, this process of nature, destined to detach the dead from the living cellular membrane, only takes place incompletely, and a small fragment of yellow dead cellular substance still continues fixed in the cavity, and hinders the cure. In this circumstance, the further employment of emollient poultices is of little or no service. The surgeon should dip the point of a camel-hair pencil in sulphuric acid, and touch the inside of the stye with it, one or more times, until the sloughy cellular membrane comes away. After this, the small cavity remaining will soon close. Should the eyelid continue afterward a little swollen and œdematous, this affection may be removed by applying the lotio plumbi. acet., containing a little spirit of wine. Some persons are very often annoyed with this disease. Scarpa imputes this most frequently to a disordered state of the *primæ viæ*, often met with in persons who live on acrid irritating food, and drink too much spirits.[*] (*Scarpa, sulle Malattie degli Occhi, cap.* 2.)

HOSPITAL GANGRENE. (*Phagedæna Gangrænosa; Putrid, or Malignant Ulcer; Hospital Sore; Gangræna Contagiosa.*) A severe and peculiar species of humid gangrene, or rather a combination of this affection, with phagedenic ulceration. It is particularly characterized by its contagious or infectious nature; its disposition to attack wounds or ulcers, in crowded hospitals, or other situations, where many of these cases are brought together; and its tendency to convert the soft parts affected into a putrid glutinous, or pulpy substance, in which no trace of their original texture is discernible. (*Delpech, Précis Elém. des Mal. Chir. T.* 1, *p.* 123.) It is generally believed to be communicated from one sore or wound to another, by its contagious nature; but whether the infection can be transferred only by actual contact, or both in this way and through the medium of the atmosphere, is a question on which the best authors differ. The first origin of the disease, however, is a mysterious subject, which cannot invariably be explained on any certain principles, as will be hereafter noticed.

From the researches of Mr. Blackadder, it appears probable, that several of the ancient writers, in their descriptions of foul, gangrenous bleeding ulcers, must have alluded to the same kind of disease, which is now usually denominated hospital gangrene. Besides the use of the actual cautery, which, according to the modern French writers, is the surest means of arresting this distemper, several of the ancients appear also to have employed for the cure arsenical applications; as, for instance, Ætius, Paulus, Rolandus, Avicenna, Guido, &c. The only doubt whether these authors actually referred to hospital gangrene, depends upon their not having generally described its contagious nature. But, on this point, I would particularly wish the reader to consult Mr. Blackadder's valuable treatise. (*P.* 76, *&c.*)

Although La Motte made cursory mention of hospital gangrene in 1722, under the name of *pourriture*, and stated, that it had occurred in the Hôtel-Dieu at Paris, yet the first distinct modern account of this disease is contained in the 3d vol. of the posthumous works of Pouteau, published in 1783. In the year 1788, Dusassoy, who succeeded Pouteau as chief surgeon of the Hôtel-Dieu at Lyons, also published a short treatise on the disorder. The first very accurate description of hospital gangrene, in the English language, appeared in the 6th vol. of the London Medical Journal, printed in 1785. The account is entitled "Observations on the Putrid Ulcer, by Mr. Gillespie, surgeon of the Royal Navy." In the edition of Dr. Rollo's work on Diabetes, published 1797, there is a section on this subject, entitled, "A short account of a morbid poison, acting on sores, and of the method of destroying it." In 1799, Sir Gilbert Blane, in the 3d edit. of his book on the diseases of Seamen, gave an account of hospital gangrene, under the name of malignant ulcer; and Dr. Trotter, in the 2d vol. of his Medicina Nautica, published in the same year, described that affection by the same appellation. In the 3d vol. of the same work, Dr. Trotter has added to his first account several valuable communications, relating to this disease, received from surgeons of the Royal Navy. Mr. John Bell has also made hospital gangrene the subject of particular remark, in the 1st vol. of his Principles of Surgery, published in 1801. According to Dr. Thomson, two excellent theses have likewise been published on the subject in the University of Edinburgh; the first entitled "De Gangrænâ Contagiosâ," by Dr. Leslie in 1804; the second by Dr. Charles Johnson, in 1805, under the title of "De Gangrænâ Contagiosâ Nosocomiale." (See *Lectures on Inflammation, p.* 456—458.)

Professor Thomson's account of the subject, published in 1813, contained the fullest history of the disease at that time collected. Boyer afterward gave a very fair account of the distemper. (See *Traité des Mal. Chir. T.* 1, *p.* 320, 8*vo. Paris*, 1814.)

These descriptions were followed by the valuable essay of Delpech, entitled "Mémoire sur la Complication des Plaies et des Ulcères connue sous le nom de Pourriture d'Hôpital;" 1815; some interesting observations by Dr. Hennen, in the London Medical Repository for March, 1815; a paper by Professor Brugman, of Leyden, "in the Annales de Littérature Med." vol. 19, 1815; and lastly, the treatise of Mr. Blackadder, which contains some of the best remarks ever made concerning this affection, and is entitled "Observations on Phagedæna Gangrænosa, 8vo. Edinb. 1818."

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[*] I have very often found an *alum curd*, applied over night in the form of poultice, of great benefit in this disease. When made use of just after suppuration has commenced, the tumour discharges in a few hours, and the patient is freed from a very troublesome and painful companion. It is prepared by putting a piece of alum, about the size of a pea, into a table spoonful of new milk. This, by the flame of a candle, is soon coagulated, and rendered of a consistence fit to be made use of as a cataplasm.—[*Am. Ed.*]

According to Mr. Blackadder, who is a believer in the doctrine of the complaint being only communicable by the direct application of the infectious matter, when the morbific matter, which produces the disease, has been applied to some part of the surface of the body, from which the cuticle has been removed, as by a blister, one or more small vesicles first appear, which are filled with a watery fluid, or bloody serum of a livid or reddish brown colour. The situation of the vesicle is generally at the edge of the sore. Its size is not unfrequently that of a split garden pea, and is easily ruptured, the pellicle which covers it being very thin. When the vesicle is filled with a watery fluid, and has not been ruptured, it assumes the appearance of a grayish-white or ash-coloured slough; but, when it contains a dark-coloured fluid, or has been ruptured, it puts on the appearance of a thin coagulum of blood, of a dirty, brownish, black colour. During the formation of the vesicle, there is generally a change in the sensation of the sore, accompanied with a painful feel, like that of the sting of a gnat.

After a slough is formed, it spreads with more or less rapidity, until it occupies the whole surface of the original sore; and, when left to itself, (which seldom happens) there is little or no discharge, but the slough acquires daily greater thickness.

"When the formation of the slough has been interrupted, the stinging sensation becomes more frequent and acute; phagedenic ulceration quickly commences; and such is frequently the rapidity of its progress, that even in the course of a few hours, a very considerable excavation will be formed, while the parts in the vicinity retain their usual healthy appearance." The cavity, the edges of which are well defined, is filled with a thick glutinous matter, which adheres strongly to the subjacent parts. When this matter is removed, the surface underneath presents itself of a fine granular texture, which, in almost all instances, is possessed of extreme sensibility, and is very apt to bleed when the operation of cleaning is not performed with great delicacy. At each dressing, the circumference of the cavity is found enlarged, and if there are more than one, they generally run into each other. The progress of the disease is much quicker in some inividuals than others, but *it never ceases, until the whole surface of the original sore is occupied.* The stinging pain gradually becomes of a darting or lancinating kind; and *either about the fourth or sixth day from the time when the morbific matter had access to the sore, or afterward, at the period of what may be termed secondary inflammation, the lymphatic vessels and glands are apt to become affected.* The discharge becomes more copious, its colour varying from a dirty yellowish white to a mixture of yellow, black, and brown, depending upon the quantity of blood mixed with it.

"The soft parts, in the immediate vicinity of the sore, daily become more painful, tumefied, and indurated; and, in a great number of cases, particularly in those of plethoric and irritable habits, an attack of acute inflammation speedily supervenes, and is acccompanied by a great increase of pain, the sensation being described to be such as if the sore were burning. The period at which this inflammation begins to subside, is by no means regular. Sometimes it subsides in the course of two days, and sometimes it continues upwards of five; depending very much on the constitution and previous habits of the patient, as well as the treatment that has been adopted. During its progress, the thick, putrid looking, and frequently spongy slough which is formed on the sore, becomes more and more moist, and of a *pulpy* consistence. (Hence this form of disease is actually named by Gerson *pulpy gangrene.*) In the course of a few days, a very offensive matter begins to be discharged at its edges. The slough then begins to separate; by and by it is thrown off, but only to prepare the way for an extension of the disease by a continued process of ulceration, and by a recurrence of the last-mentioned symptoms. (*Blackadder, on Phagedæna Gangrænosa, p.* 28—30.)

The first symptoms, which indicate hospital gangrene in a wound, or ulcer, are, a more or less acute pain, and a viscid whitish exudation on the surface of the granulations, which lose their vermilion colour, and present at several points spots of a grayish or dirty-white hue, resembling venereal ulcers, or aphthæ. These ulcerated points, thus engrafted (as it were) upon the original ulcer, soon spread, and join together, so as to give to the whole surface of the solution of continuity a gray ash-colour. The surface also becomes more or less indurated, and sometimes bleeds. A red, purplish œdematous circle, of a greater, or lesser extent, is next formed in the surrounding skin. Sometimes, when the patient is of a good habit, the causes of infection less active, and the constitution sufficiently strong, the disorder now stops. According to Boyer, it may not even extend to the whole surface of the ulcer. But, most frequently, its progress is extremely rapid, and occasionally quite terrifying. The edges of the wound, or ulcer, become hardened and everted, the granulations are large and tumid, being swelled up, as Boyer asserts, with a considerable quantity of gas. They are afterward detached in the form of soft reddish sloughs, which very much resemble the substance of the fœtal brain, in a putrid state. From day to day, until either nature alone, or aided by art, puts limits to the disorder, it invades new parts both in breadth and depth, so that its ravages extend to aponeuroses, muscles, blood-vessels, nerves, tendons, the periosteum, and even the bones themselves.

Among a number of severe cases, which fell under the notice of Mr. Blackadder, there was one, in which the half of the cranium was denuded, the bones having become black as charcoal, and the integuments detached posteriorly to the second cervical vertebra, and anteriorly to the middle of the zygomatic process of the temporal bone; and this was originally a superficial wound of the scalp. In another case, the muscles, large arteries, and nerves, of both thighs were exposed and dissected, the integuments and cellular substance being entirely removed, with the exception of only a narrow strip of the former, which remained on the outer side of the thighs. This was also originally a simple flesh wound. In other instances, the cavities of the knee, ankle, elbow, and wrist joints, were laid extensively open, and, in one unfortunate case, the integuments and cellular substance, on the anterior parts of the neck, were destroyed, exhibiting a horrid spectacle, the trachea being also wounded." (*On Phagedæna Gangrænenosa, p.* 3.)

According to the last experienced author, when the disease attacks an old sore, where a considerable depth of new flesh has been formed, the first thing generally observed is a small dark-coloured spot, usually situated at the edge of the sore. But, he states, that in several cases of ulcers, the disease, when carefully watched, was found to begin in the form of a vesicle, filled with a livid, or brownish-black fluid, which afterward burst and assumed the appearance of the dark-coloured spot, which is commonly first noticed. Mr. Blackadder always found, that, when there had been a considerable bed of new flesh formed, the phagedenic ulceration made comparatively a very slow progress, and put on rather the appearance of mercurial phagedæna, until the morbific matter had found access to the natural texture of the part, when the progress of the disease became suddenly accelerated; acute inflammation supervened; and a large slough was formed. (*Op. cit. p.* 31.) He notices, that when the morbific matter is inserted in a puncture, or scratch, the first progress of the disease bears a resemblance to that of a part inoculated with vaccine matter. The primary inflammation in gangrenous phagedæna commences at the end of the second, or early on the third day; the inflammation is at its height about the sixth; when the scab begins to form in one disease, phagedenic ulceration begins in the other, and when allowed to proceed, soon affords sufficient proof of the non-identity of the two diseases. (*P.* 33.)

According to Mr. Blackadder, when the disease attacks a recent gun-shot wound, the discharge, two or three days after infection, is found to be lessened, and to have become more of a sanious, than purulent nature. The sore has a certain dry and rigid appearance; its edges are more defined, somewhat elevated, and sharpened; the patient is sensible of a change in the usual sensation in the sore, and complains of the occasional stinging sensation, resembling that produced by the sting of a gnat. At this period, but sometimes a day or two later, the integuments at the edge of the sore become inflamed, and the surface of the sore itself assumes a livid or purple colour, and appears as if covered with a fine pellicle, such as is formed on a coagulum of blood." (*On Phagedæna Gangrænosa, p.* 33.)

At Bilboa, the disease in cases of wound, is said generally to have commenced with a sudden attack of severe pain in the head and eyes, tightness about the forehead, want of sleep, loss of appetite, a quick pulse, and other febrile symptoms; while the wound, which had been healthy and granulating, at once became tumid, dry, and painful, losing its florid colour, and assuming a dry and glossy coat. (*Hennen on Military Surgery, p.* 214, *Ed.* 2.) When left to itself, the above-described pellicle gradually increases in thickness, forming what has been termed a slough. But, Mr. Blackadder observes, that at this period, the progress of the disease is hardly in any two instances precisely alike. Generally, in the course of from five to ten, or fifteen days, a thick spongy, and putrid-looking slough is formed over the whole surface of the sore, and which is more or less of an ash, or blackish-brown colour. When the pellicle is destroyed, as frequently happens in the process of cleaning, it is not in every case reproduced; but, an offensive matter begins to be discharged, which becomes daily more copious, is of a dirty yellow colour, and ropy consistence, and is very adherent to the sore. The substance, which formed the apparent bottom of the wound, is raised up, and pushing the edges, makes the sore appear considerably enlarged. The edges, which are usually jagged, or pectinated, become extremely irritable, of a deep red colour, and dotted on their inner surface, with numerous small elevated, and angry-looking points, *which may be considered as one of the characteristics marks of the disease.* The surrounding integuments become indurated and inflamed, assuming, not unfrequently, an ansarine appearance; and the patient complains of a constant burning, lancinating pain. In the vicinity of the sore, the integuments become more and more of a dark red colour, in consequence of the violence of the inflammation, which is of an erysipelatous nature, and apt to terminate in sloughing, and carry off the patient. However, the inflammatory symptoms are sometimes mild, and in other cases, exceedingly violent; a fact accounted for by differences of constitution. (*Blackadder, p.* 34.)

In the hospitals at Bilboa, if the incipient stage was overlooked, the febrile symptoms very soon became aggravated; the skin around the sore assumed a highly florid colour, which shortly became darker, then bluish, and at last black, with a disposition to vesicate; while the rest of the limb betrayed a tendency to œdema. All these threatening appearances occurred within twenty-four hours, and at this period also, the wound, *whatever might have been its original shape, soon assumed the circular form.* The sore now acquired hard, prominent, ragged edges, giving it a cup-like appearance, with particular points of the lip of a dirty yellow hue, while the bottom of the cavity was lined with a flabby blackish slough. The gangrene still advancing, fresh sloughs were rapidly formed; the increasing cup-like cavity was filled up and over-topped by them, and the erysipelatous livor and vesication of the surrounding skin gained ground, while chains of inflamed lymphatics could be traced from the sores to the adjoining glands, these exciting inflammation and suppuration, which often furnished a new nidus for gangrene. The face of the sufferer assumed a ghastly anxious appearance; his eyes became haggard, and deeply tinged with bile; his tongue covered with a brownish, or blackish fur; his appetite entirely failed; and his pulse was feeble and accelerated. In this stage, the weakness and irritability of the patient was such, that the slightest change of posture put him to torture, increased by his inability to steady the limb, which, if lifted from the bed, was seized with tremors and spasmodic twitches. (*Hennen's Military Surgery, p.* 215, 216, *Ed.* 2.) Authors vary considerably in their descriptions of the state of the tongue. Dr. Hennen found it brownish, or blackish; Delpech whitish, or yellowish, (*Précis. Elem. T.* 1. *p.* 125,) and Mr. Blackadder, covered with a white mucus. (*P.* 39.)

It is explained by Mr. Blackadder, that when the disease attacks a large recent wound, the whole surface of the injury is sometimes affected from the first; while, in other instances, the disorder commences on, or near the lips of the sore. When the patient is of an inflammatory diathesis, the sore is generally attacked with acute inflammation between the seventh and fourteenth days; the slough becomes softer, and of a pulpy consistence; matter, of a strong, and peculiar odour, and of a dirty brownish gray colour, begins to ooze out at its edges, and becomes daily more copious. The inflammation gradually subsides; the slough becomes loosened, and finally detached, leaving the subjacent muscles, bones, fasciæ, or ligaments, completely exposed. When the constitution is not prone to acute inflammation, the slough remains long adherent; the discharge is very copious, and burrows under the skin, which then mortifies. Sometimes, after the detachment of a slough, florid granulations spring up, and, notwithstanding a slight recurrence of the phagedenic ulceration, the parts heal up by the almost unasisted operations of nature. However, most commonly after the muscles are exposed, they continue to be gradually dissected; their connecting cellular membrane is completely destroyed, and they are left covered with an offensive, greasy-looking matter.

According to Mr. Blackadder, when a muscle has been wounded, it swells sometimes to a great size, and quickly assumes the appearance of a large coagulum, being altogether deprived of irritability. When it has not been wounded, but has become inflamed, it generally assumes a pale colour, with an appearance as if distended with a fluid, and, occasionally, before losing its vitality, acquires a very surprising bulk; but when no inflammation has supervened, the muscles become of a pale brick colour, waste away daily, and the patient loses all power in them. As the disease advances, the integuments are undermined and slough; and hemorrhage from small vessels is a common occurrence; but, in a more advanced stage, some of the large vessels are apt to give way, and the bleeding from them frequently destroys the patient.

"When a stump is the site of the disease, and the patient is of a plethoric habit, or accustomed to live freely, the symptoms soon begin to indicate the existence of an intense inflammatory action through its whole substance, the tumefaction, pain, and heat increase rapidly, so that, in a few days, the stump shall have acquired more than twice its former size, being at the same time much indurated, and causing the most excruciating pain. In this state, the patient has, in some instances, become delirious, and has been cut off by an effusion taking place into some of the larger cavities. It more commonly happens, however, that gangrene seizes upon the integuments, and cellular substance: large sloughs are thrown off; and some of the large blood-vessels giving way, the patient sinks under the effects of repeated hemorrhage. For it is commonly found, that the usual modes of stopping hemorrhage from a stump are, in such cases, either inadmissible, or totally inefficacious.

"Sometimes, the progress of the disease in a stump is more gradual, but in the end nearly as fatal; the inflammation is much less acute; there is comparatively but little tumefaction, and the pain is much less severe; but, the discharge is much more copious, and the cellular substance, connecting the integuments and muscles, is rapidly destroyed. Hemorrhage generally comes on later than in the preceding instance, but it is the most common cause of death." (*Blackadder on Phagedæna Gangrænosa, p.* 33—39.)

It is observed by another writer, that artery seems to be the texture, which resists most powerfully the destructive action of hospital gangrene; (*Thomson's Lectures, p.* 460) a remark quite at variance with the statement of Delpech; (*Précis Elém. T.* 1, 129) but intended to refer, as I conceive, to cases in which the femoral, brachial, or other large artery is seen for several days completely denuded, in the midst of the ravages of the distemper, yet not giving way. I have seen the same thing frequently exemplified in mercurial phagedæna, as well in the groin, as in the arm. As for the smaller arteries, they are quickly destroyed, together with other parts.

"In some rare cases (says Dr. Hennen) I have seen the femoral and axillary artery pulsating awfully, and apparently unaffected with disease; while all the surrounding parts were completely destroyed; but in a vast majority of cases, the blood-vessels partook of the general disease, in which they were imbedded. They were not only completely separated from their natural connexions, but their coats sloughed away at the immediate point of disease, while the disposition extended far beyond the apparently affected spot. Hence, our ligatures but too often failed on the main branches, and any attempt on the smaller was invariably injurious. We were here naturally induced to tie the artery considerably above the seat of the disease; and this was done once on the femoral, and twice on the axillary artery below the clavicle; the former burst on the third, each of the latter, on the second day afterward." Dr. Hennen further remarks, that, in general, the great vessels sloughed long after the acute symptoms of the disease had abated, and that, in severe cases, the eleventh day of the disease was always dreaded. (*On Military Surgery, p.* 221, *Ed.* 2.) The indisposition of the large vessels to close, when taken up in the common way, appears referable to three causes, viz. the tendency to rapid ulceration in the arteries in the situation of the ligatures; the formation of no effectual coagulum in the extremity of the vessel, like what happens in other cases of mortification; and the general incapacity of nature in examples of hospital gangrene to establish any process, which can be accompanied with healthy adhesive inflammation.

In the last stage of the disease, as it occurred in the military hospitals at Bilboa, the surface of the sore was constantly covered with a bloody oozing, and, on lifting up the edge of the flabby slough, the probe was tinged with dark-coloured grumous blood, with which also its track became immediately filled. Repeated and copious venous bleedings now came on, which rapidly sunk the patient; the sloughs, whether they fell off spontaneously, or were detached by art, were quickly succeeded by others, and brought into view thickly studded specks of arterial blood. At length, an artery gave way, which was generally torn through in the attempt to secure it with a ligature; the tourniquet, or other pressure was now applied, but in vain; for, while it checked the bleeding, it accelerated the death of the limb, which became frightfully swelled and horribly fetid. Incessant retchings came on, and with coma, involuntary stools, and hiccough, closed the scene. Often, however, the patient survived this acute state of the disease, and sunk under severe irritation, absorption of putrid matter, and extensive loss of substance, with common hectic symptoms. (See *Hennen's Mil. Surgery, p.* 217, *Ed.* 2.) In the disease at Bilboa, the skin and cellular substance seemed to be the parts originally and principally affected. This, says Dr. Hennen, was obvious, even in the living body; but, on dissection, the disease of these parts was frequently observed to spread much further, than external appearances indicated, as a diseased track was often found running up into the groin, or axilla, and completely dissecting the muscles and great vessels. (*On Military Surgery, p.* 219, *Ed.* 2.) When the disease had occupied the outside of the chest, the same gentleman found the lungs in two cases, and the pericardium in a third, covered with gangrenous spots; and, when the parietes of the abdomen had been attacked, he often observed the same appearances on the liver. (*P.* 220.)

Hospital gangrene must be regarded, as one of the most serious and dangerous complications, to which wounds and ulcers are liable. When the solution of continuity is large, or of long standing, the disorder commits great ravages, renews its attacks repeatedly, and the relapses prove exceedingly obstinate. The same thing is said to happen, when it affects persons labouring under scorbutic or venereal complaints. Hospital gangrene proves particularly dangerous, and mostly fatal, when it complicates large contused wounds, attended with badly fractured bones. All the soft parts of the injured limb are then frequently observed to be progressively destroyed, and the unfortunate patient falls a victim, either to typhoid symptoms, frequent hemorrhages, or hectic complaints. From what has been stated, however, the disease varies considerably in its severity in different cases, being sometimes of small extent, and even capable almost of a spontaneous cure. Patients have been known to continue afflicted more than a month, and when the duration of the disease was thus lengthened, the cases almost always had a fatal termination. In a few cases, the wound puts on a favourable appearance again between the sixth and ninth days; and, in slight examples, the amendment is manifested between the third and fifth. Whatever may be the period of the complaint, its wished-for termination is always announced by a diminution of pain; the pus acquiring a white colour, and more consistence, and losing its fetid nauseous smell. The edges of the ulcer subside, while its surface becomes less irregular, and puts on more of the vermilion colour. The red, purplish, œdematous circle, which surrounds the disease, assumes a true inflammatory nature, and the solution of continuity, restored to a simple state, heals up with tolerable quickness, even when the destruction of soft parts is somewhat considerable, unless any fresh untoward circumstances occur to interrupt cicatrization. But, sometimes, when the patient is on the point of being completely well again, his condition is suddenly altered for the worse; ulcerated spots make their appearance on the cicatrix, and these spreading in different directions occasion a relapse, which may happen several times.

From numerous cases of this disease, seen by Mr. Blackadder at Passage in Spain, this gentleman made the following conclusions:

1. That the morbid action could almost always be detected in the wound, or sore, *previous to the occurrence of any constitutional affection.*

2. That in several instances, the constitution did not become affected, until some

considerable time after the disease had manifested itself in the sore.

3. That when the disease was situated on the inferior extremities, the lymphatic vessels, and glands in the groin, were observed to be in a state of irritation, giving pain on pressure, and were sometimes enlarged, before the constitution showed evident marks of derangement.

4. That the constitutional affection, though sometimes irregular, was in many cases contemporary with the second, or inflammatory stage.

5. That all parts of the body were equally liable to become affected with this disease.

6. That, when a patient had more than one wound, or sore, it frequently happened, that the disease was confined to one of the sores, while the other remained perfectly healthy, and that even when they were at no great distance from each other. (*On Phagedæna Gangrænosa, p.* 19.)

Thus Mr. Blackadder espouses the opinion, that hospital gangrene is at first a *local*, and not a *constitutional disease*, that is to say, not necessarily preceded, or originally accompanied by any diseased action in the system. It is highly important to weigh this distinction well, not only because it is yet the chief point of difference among the best writers on the subject, but because it involves very directly every theory respecting the causes of the disease, and the great question, whether its ravages are to be resisted principally by local or constitutional means, or by remedies of both descriptions together.

In the hospital gangrene, observed by Dr. Rollo in the artillery hospital at Woolwich, "The action of the poison seemed to be limited and confined to specific effects. *The first were local, producing only a general affection, by a more extensive operation on the sore.* Five or six days from the appearance of the small ulcer or ulceration, when it had extended over one-third of the former sore, with pain and redness in the course of the lymphatics, and the glands, through which they led, with enlargement of them, general indispositon of the body became evident." Delpech, in his interesting memoir, particularly notices, that the constitutional symptoms *always occurred the last in order of succession.*

Mr. Blackadder distinctly declares, that, in no instance, which he had an opportunity of observing, did the constitutional symptoms of gangrenous phagedæna precede the local, unless the case be held an exception, in which a stump became affected, after amputation had been performed, on account of the previous effects of the disease. The period at which the constitution begins to exhibit symptoms of irritation (he says) is extremely irregular,—sometimes as early as the third, or fourth day, and sometimes even as late as the twentieth. The countenance assumes an anxious or feverish aspect; the appetite is impaired; the desire for liquids increases; and the tongue is covered with a white mucus. The bowels are generally rather constipated; and the pulse, what may be termed, rather irritated, than accelerated. But, the general symptoms may assume an inflammatory, or typhoid character, according as the causes of one of these modifications may predominate. According to Mr. Blackadder, when an inflammatory diathesis prevails, the system becomes gradually more irritated, until an attack of acute inflammation seizes upon the sore, and which frequently happens about the end of the second week. At this period, the pulse is frequent and sharp, and it is not uncommon for the patient to be seized with one, or more shivering fits, succeeded by a great increase of heat, but seldom, or never terminating in a profuse perspiration. The cold fit is sometimes followed by a bilious discharge from the intestines, and mitigation of the febrile disorder. If the local mischief be not arrested, the strength becomes daily more and more exhausted; the fever loses its inflammatory character; and, unless the patient be cut off by hemorrhage, he falls a victim to extreme debility. When the disease has a typhoid character, the pulse is small and frequent; the appetite and strength gradually fail; and the patient at last sinks, retaining his mental faculties to the last. Not unfrequently diarrhœa hastens the event. (*Blackadder on Phagedæna Gangrænosa, p.* 39, 40.)

On the other hand, the generality of writers, nay, even some of those who represent the disease as always proceeding from a species of infection applied to the wound, take into the account the operation of constitutional causes, as predisposing to, and of course preceding the local symptoms. Dr. J. Thomson believes, that the constitutional symptoms mostly precede the local. (*On Inflammation, p.* 459.) The same sentiment is professed throughout Dr. Hennen's remarks, who placed reliance chiefly upon internal remedies, and regarded external applications, as merely a secondary object. (*On Military Surgery, p.* 222, *Ed.* 2.) To this part of the subject, I shall return, after adverting to the causes of hospital gangrene.

The hospital gangrene, which occurred in the Artillery Hospital at Woolwich, and was described by Dr. Rollo, did not attack specific sores: venereal, scrofulous, and variolous ulcers were not attacked, although the patients lay in the wards, where the disease prevailed.

Professor Thomson admits, that specific sores are less liable to attacks of hospital gangrene, than common wounds and ulcers; but, he declares, that he has frequently seen it attack cancerous and venereal ulcers. (*On Inflammation, p.* 460.)

Dr. Hennen mentions a remarkable instance, which also proves the possibility of a specific sore becoming affected, and fatal from this cause in forty-eight hours after the patient had first been exposed to the infection. Dr. Hennen relates the fact to prove, that the contagion may be received, without a long residence in a tainted air. The patient, "who had just landed from England, and was under the influence of mercury, employed for a venereal complaint, died within forty-eight hours after his admission, the gangrene having seized on an open bubo in his groin, eroding the great vessels in the neighbourhood, and absolutely destroying the abdominal parietes to a large extent." (*Principles of Military Surgery*, p. 218, *Ed* 2.)

The effects of hospital gangrene should be carefully discriminated from those of the scurvy. Ulcers, attacked with hospital gangrene, are not affected in any degree, like scorbutic ulcers, by the use of vegetable diet and lemon-juice, and they occur among men, who are fed upon fresh meat and vegetables, as readily as they do among those who have been fed altogether upon salt provisions. (*Thomson's Lectures on Inflammation*, p. 482.) Hospital gangrene is almost always accompanied with severe febrile symptoms; but, "as to fevers, (says Dr. Lind,) it may indeed be doubted whether there be any such as are purely and truly scorbutic. The disease is altogether of a chronic nature; and fevers may be justly reckoned among its adventitious symptoms." (*Treatise on the Scurvy*, p. 106.) In cases of hospital gangrene, the general symptoms of scurvy are also absent, such as soreness and bleeding of the gums, livid blotches and wheals on the fleshy part of the legs, œdematous ankles, &c.

Hospital gangrene (says Boyer) is a species of humid gangrene, which attacks in some degree *epidemically* the wounds and ulcers of patients, who happen to be crowded together in an unhealthy place.

Its occasional causes are; the situation of an hospital upon a low marshy ground; the vicinity of some source of infection; the uncleanliness of the individuals or of the articles for their use; the crowded state of the wards, especially when they are small and badly ventilated; lastly, every thing that tends to corrupt the air which the patients breathe. An infected atmosphere may produce in the most simple wounds unfavourable changes, partly, as Boyer conceives, by its immediate action on the surface of the wound, but no doubt principally by its hurtful influence upon the whole animal economy. The foregoing causes have also sometimes produced alarming and obstinate gangrenes of an epidemic kind, or at least, a state of the constitution, under the influence of which all wounds and ulcers constantly took on a bad aspect, and were often complicated with the most gangrenous mischief. Vigaroux saw such an epidemic disease prevail for twenty months in the two hospitals of Montpellier, and he states, that the most powerful antiseptics were of little avail against the disorder, which often invaded the slightest scratches.

In general, this epidemic species of gangrene is not observed in new-built hospitals, nor in those which are erected out of the central parts of cities, upon high ground.

Hospital gangrene may occur in any season; but it is most common after the sultry heat of summer.

A bilious constitution, mental trouble, unwholesome or insufficient food, a scorbutic diathesis, great debility, and fevers of a dangerous type, are also reckoned by the French surgeons as so many predisposing causes of hospital gangrene.

The observations of Pouteau, and those of some other practitioners, convincingly prove, that hospital gangrene may be communicated to the most simple wound, or ulcer, in a subject of the best constitution, and breathing the purest air, by merely putting into contact with such wound or ulcer, sponges, lint, or charpie, impregnated with the infection of this peculiar disorder. But, this inoculation is conceived to be the more alarming, and to take effect the more quickly, in proportion as patients have been more exposed to the influence of such causes as are themselves capable of producing the disease, and also in proportion as the kind of constitution predisposes to it.

Although the contagious nature of hospital gangrene has been generally admitted by all the best informed writers on the subject, the doctrine was not considered by Dr. Trotter as having a good foundation. Modern authors, however, have not joined this latter gentleman, and Dr. J. Thomson, Dr. Hennen, and Mr. Blackadder, all believe, that the disorder is infectious. "The contagious nature of hospital gangrene (says Professor Thomson) appears to me to be sufficiently proved, 1st. By the fact, that it may be communicated by sponges, charpie, bandages, and clothing, to persons at a distance from those infected with it. 2dly, By its having been observed to attack the slight wounds of surgeons, or their mates, who were employed in dressing infected persons; and that, even in circumstances, where the medical men so employed, did not live in the same apartment with the infected. 3dly, By our being able often to trace its progress distinctly from a single individual through a succession of patients. 4thly, By its attacking recent wounds, as well as old sores, and that in a short time after they are brought near to a patient affected with the disease. 5thly, By our being able to prevent the progress of the disease in particular situations, by removing the infected person, before the contagion, which his sores emit, has had time to operate. 6thly, By its continuing long in one particular ward of an hospital, or in one particular ship, without appearing in other wards, or ships, if pains be taken to prevent intercourse between the infected and uninfected." (*Lectures on Inflammation*, p. 484.) But, although there can be no doubt of the disease spreading partly by its contagious nature, it appears to me equally certain, that the number of cases is also often increased by the continued operation of the same causes, which produced the earliest instance of the disorder in any particular hospital.

It is alleged, that when once a patient has taken the infection, he cannot avoid the consequences, whatever precautions he may adopt. Thus, Boyer informs us, that he has seen hospital gangrene take place in wounded patients, who, in the hope of escaping this epidemic affection, had quitted the infected hospital, and retired to elevated situations, where they breathed the most salubrious air. (See *Traité de Mal. Chir, T.* 1, *p.* 322.)

The bad state of the air of a crowded hospital, as Mr. Blackadder observes, is a ready means of accounting for the origin of phagedæna gangrænosa; but, there are various reasons for considering such explanation not altogether satisfactory; and he mentions a case, in which the wound of a soldier was found affected with the disease on his first arrival at an hospital, after having been accidentally detained, with two other wounded comrades, for five or six days, partly in an open building, and partly in a boat, quite exposed to stormy weather. (*P.* 45.) Dr. Hennen likewise gives an account of about thirty fresh wounded men, in whom hospital gangrene first appeared in their journey from Vittoria to the hospital near Bilboa. (*Principles of Military Surgery, p.* 214, *Ed.* 2.) Dr. Rollo also remarked, that some men in quarters were affected with this disease. And, according to Mr. J. Bell, "there is no hospital, however small, airy, or well regulated, where this *epidemic* ulcer is not to be found at times." (*Principles of Surgery, Vol.* 1, *p.* 112.) For a refutation of the opinion, that the disease ever strictly merits the epithets *endemial*, and *epidemic*, I must refer the reader to the observations of Mr. Blackadder. (*P.* 143. 53.) Delpech remarks, that the causes of the disease do not appear to have depended upon the state of the atmosphere, (*P.* 25;) and in almost every instance, *he traced the propagation of the disorder to the direct application of the morbific matter to the sores.* However, he joins Pouteau in the belief, that it may be communicated through the medium of the atmosphere; an occurrence, which Mr. Blackadder doubts, or, rather considers as very rare, and only possible where the effluvia are allowed to accumulate in a most negligent manner, so as to resemble a vapour bath, which mode he would also regard as equivalent to inoculation. (*On Phagedæna Gangrænosa, p.* 156.) On the whole, I am disposed to think the views, which Mr. Blackadder has taken of the manner in which the disease is communicated, the most correct, hitherto published, and that, while particular states of the air and constitution certainly modify the disorder, they cannot generally have any share in giving origin to the disease; I say *generally*, because as various facts oblige us to admit, that hospital gangrene sometimes arises, without having been communicated from any patient previously affected, it is impossible to assert, that the earliest example of it, under such circumstances, may not arise from the operation of some unknown and inexplicable circumstances on the constitution, or in other words, from the state of the system itself. Nor can a doubt be entertained, that, at all events, the disorder is most apt to break out in crowded, badly-ventilated hospitals, and in them appear more extensively and malignantly, than in others, which are well-regulated, properly ventilated, and healthily situated. But, the idea, entertained by Delpech, that hospital gangrene may originate from the same contagion as typhus, or other diseases, is a mere unsupported, irrational conjecture, quite as destitute of the truth, as the suppositions about the endemial and epidemic character of the complaint, independent of its infectious nature. The question, how the first example of the disorder originates, is at present a perfect mystery; but, as it cannot be referred to contagion, or inoculation, we should recollect, that whatever produces it in one individual, may produce it in another, similarly circumstanced, and, on this principle, the disorder may sometimes be formed independently, and at the same time, in a greater or lesser number of patients in the same hospital, as well as spread from these to others by infection.

With the view of preventing the disorder, the wards in which the wounded are placed, should not be crowded; they ought to be freely ventilated, and, if possible, not communicate. The utmost attention to cleanliness should be paid; and all filth and stagnant water removed. It has been asserted, but with what accuracy I cannot determine, that the predisposition of the wounded to this species of gangrene may be lessened by a well-chosen diet, by drinks acidulated with vegetable acids, or with the sulphuric acid, and by the moderate use of wine. The state of the stomach and bowels should be particularly attended to, and, if out of order, emetics and purgatives ought to be immediately employed, and repeated according to circumstances. The dressings should be applied with extreme attention to cleanliness, and too much care cannot be taken to prevent the infectious matter of one wound from coming into contact with another through the medium of sponges, instruments, &c. "Whatever may be the source of this disease (says a late writer) it is at least sufficiently ascertained, that, when it occurs, its propagation is only to be prevented by the most rigid attention to cleanliness, and by insulating the person, or persons affected, so as to prevent all direct intercourse between them and the other patients; for, so far as I have had an opportunity of observing, ninety-nine cases in the hundred were evidently produced by a direct application of the morbific matter to the wounds, dressings, &c.; while others, who were, in every other respect, equally exposed to its operation, never caught the disease. In attempting to prove this by experiment, I have placed three patients with clean wounds alternately between three other patients, severely affected with the disease. They lay in a part of a ward, which was appropriated for patients, who were labouring under the disease, and of whom there were at the time a considerable number. Their beds were on the floor, and not more than two feet distant from each other; but, all direct intercourse was forbidden, and they were made fully aware of the consequences that would follow from inattention to their instructions. The result of this trial was, that not one of the clean wounds assumed the morbid action peculiar to the disease, nor was the curative process in any degree impeded." (*Blackadder on Phagedæna Gangrænosa, p.* 46.)

As many experienced writers assert, that the disease may also be communicated from one person to another through the medium of effluvia in the air, I am firmly persuaded that, in the present state of our knowledge of the subject, the cautions, respecting ventilation, cleanliness, (the chief practical deduction from the latter doctrine) are highly necessary and important. This sentiment may be adopted, without implicit faith being placed in the opinion, that the disorder can actually be transmitted from one person to another through contagion in the air, because whether the last idea be true, or not, attention to cleanliness and ventilation must be beneficial to the health, in this, as in every other species of gangrene; and, on this principle, they must be serviceable in diminishing the severity, if not the frequency and extent, of the disease, as I am myself disposed to believe from the consideration of all the evidence adduced. Where circumstances will permit, an entire removal of the patients from the place, in which the disease has either had its first formation, or spread to any extent, appears likewise to be a most beneficial measure. But, when this change of the wards, or hospital, is impracticable, the air which the patients breathe, should be purified, by renewing it as much as possible, fixing ventilators, and especially by using the oxygenated muriatic acid fumigations, as recommended by Guyton-Morveu, or else those of the nitric acid.

The nitric acid fumigations are made by putting into a glass vessel, on the ground, half an ounce of concentrated sulphuric acid, to which an equal quantity of nitre is to be added *gradatim.* The mixture is to be stirred with a glass tube, when an abundance of white vapour will be produced.

The oxygenated muriatic acid fumigations are made, by mixing three ounces two drams of common salt with five drams of the black oxide of manganese in powder. These two ingredients are to be triturated together; they are then to be put into a glass vessel; one ounce two drams of water are to be added, and then if the ward, or chamber be uninhabited, one ounce seven drams of sulphuric acid are to be poured upon the mixture all at once; or gradually, if the patients are there. This quantity will be sufficient for a very large ward.

When one or more of the patients, afflicted with the disorder, before it has become general, are lying in a badly ventilated part of the ward, the surgeon can partly counterbalance the disadvantage of not having a fresh ward, by causing the patients to be put into a more airy part of the ward, and as far as possible from the quarter, in which they contracted the disease.

With regard to internal medicines, while irritation and febrile heat accompany hospital gangrene, diluent acid drinks are proper, such as nitrated whey sweetened with syrup of violets, lemonade, &c. Blood-letting is admissible in but few instances, not merely because the orifice, made by the lancet, is apt to become gangrenous, but because the fever, which accompanies hospital gangrene, is usually of the typhoid, or asthenic character. (*Thomson, p.* 493.)

Mr. Blackadder, like Dr. Thomson, does not entertain a favourable opinion of venesection, as a general practice, though he would not object to the abstraction of a small quantity of blood, when, owing to the plethoric habit of the patient, *previous treatment*, and other causes, an inflammatory action in the system is present. But he conceives, that all danger of the disease attacking the wound, made with the lancet, may be obviated, if care be taken that the arm of the patient, the hands of the surgeon, his lancet, and the subsequent dressings, be perfectly free from contamination, and that the patient be prevented from undoing the bandage, or touching the incision made with the lancet, before it is cicatrized. (*P.* 135.) Mr. Blackadder thinks, however, that blood-letting should be avoided, as much as possible, particularly when the previous injury has been extensive. "A general debility of the system, is one of the symptoms which are most to be dreaded; for, when once it takes place, there is no other disease in which it is removed with greater difficulty." (*P.* 137.) How different these sentiments are from those of Dr. Hennen, who, in speaking of the effects of venesection, when the disorder was accompanied with an inflammatory diathesis, employs the following expressions: "The very patients themselves implored the use of the lancet." For several months we used no other remedy, either as a cure, or preventive."—"We never observed any of the lancet wounds assume a gangrenous appearance, although previously, in almost every other instance, the slightest puncture festered." *On Military Surgery, p.* 224, *Ed.* 2.)

In the beginning of the constitutional attack, Pouteau and Dussassoy particulary recommended emetics, and Mr. Briggs, Dr. J. Thomson, and Dr. Hennen, are all advocates for this practice, though the latter gentleman makes his evidence rather ambiguous, by a subjoined note, in which he mentions that want of success, &c. led to the trial of venesection. (*Op. cit.* 222.) As for Mr. Blackadder, he deems the employment of emetics at the commencement of hospital gangrene useful only when the stomach is foul. (*On Phagedæna Gangrænosa, p.* 134.) In the early stage of the case, writers seem all to agree about the utility of purgative and laxative medicines. When there is debility, good generous wine should be allowed, either by itself, or mixed with lemonade according to circumstances. Bark, whose antiseptic qualities have been so highly praised, is in general more hurtful, than useful; and Dr. Hennen assures us, that he has seen great harm done by large and injudicious doses of this drug, before full evacuations had taken place, and the sloughs begun to separate. Boyer allows, however, that it may be beneficially given, when the feverish heat has abated, and the debility is very great.

In all stages of this disease, unattended with diarrhœa, acids are proper. The sulphuric acid is that which is given with most success; but the acidulous tartrite of potassa is also an excellent medicine. From two drams to half an ounce may be given every day, and the best plan is to make an acid drink with it, which should be sweetened and strained.

In severe cases, attended with a quick and feeble pulse, depression, restlessness, and anxiety, an opiate becomes necessary. "So long as we wish to excite a degree of moisture on the skin, (says Professor Thomson) Dover's powder, or laudanum with antimonial wine, form in general the best opiates." This gentleman, however, is not an advocate for the employment of opium, in the early stage of hospital gangrene, while the heat and other febrile symptoms are at their height. (See *Lectures on Inflammation, p.* 494, 495.) For these cases, camphor, in large and frequent doses, was highly praised by Pouteau.

From what has been said concerning internal remedies, it is evident, that none of them can be regarded as means, which can be at all depended upon for arresting the ravages of hospital gangrene, however advantageous they may prove in palliating general symptoms, removing particular complications, enabling the system to support the effects of the local disorder for a greater length of time, or, in a few cases, even placing nature in a condition to throw off the diseased parts herself, and communicate to the subjacent living flesh a healty action.

If credit can be given to several of the authors, who have had the most extensive opportunities of attending to the nature of hospital gangrene, the local treatment is far more effectual than internal medicines.

"I was told by several of the French surgeons (says a late visiter to Paris,) that they did not rely at all on internal means for stopping the progress of hospital gangrene, and that their experience had proved them to be insuffient, if not wholly inefficacious. Dupuytren, in reply to the account I gave him of the practice and opinions of English surgeons on this subject, assured me, that he had no confidence but in local applications, and that internal remedies alone, as far as he had found, did almost nothing. The same remark has been made in a very recent publication on hospital gangrene, (*Delpech, Mém. sur la Complication des Plaies, &c.* 1815.) although it seems to be rather at variance with its being a constitutional and contagious disease, which the author has admitted." (See *Sketches of the Medical Schools of Paris, by J. Cross, p.* 83.)

Perhaps, there is not a single antiseptic application, which has not been tried as a dressing for wounds, or ulcers, affected with hospital gangrene. All watery applications, and common poultices, and fomentations, are generally condemned as inefficacious, and even hurtful.

Dussassoy was convinced by the observation of numerous cases, that the best application is powder of bark. He recommends the wound to be covered with several layers of this powder, which are then to be moistened with turpentine. When this composition dries, he asserts, that it forms a fragile sort of coat, at the sides of which, and through which, the discharge escapes. After twenty-four hours, the first coat is to be removed, and a fresh one applied. In general, according to this writer, four or five such dressings are sufficient in simple cases, where the disorder is confined to the skin and cellular substance. Healthy inflammation then occurs, the sloughs come away, and the wound puts on a healing appearance. In bad cases, Dussassoy sometimes added one-fifth of powdered muriate of ammonia to the bark When this treatment failed, the actual cautery was used.

On the subject of bark, as a local application to hospital gangrene, I need only remark, that it is now entirely relinquished, either as possessing no efficacy, (*Delpech*) or even aggravating the symptoms. (*Blackadder.*)

The milder forms of the disease appear sometimes to have yielded to the application of the vegetable and diluted mineral acids; lime juice; lemon juice; vinegar; and the diluted nitric, and muriatic acids. And the same observation may be made, with respect to solutions of the nitrates of silver and mercury. The two latter substances, and the oxygenated muriatic acid, and gas, were found by Dr. Rollo to be capable of effecting a cure. Delpech, in particular, speaks of the benefit derived from the application of strong vinegar, after all the pulpy viscid matter has been carefully wiped away from the surface of the living flesh. The vinegar is then poured on the ulcer, which is to be covered with charpie wet with the same liquid. When the case is too far advanced for this treatment to answer, Delpech tries caustics, especially the nitrate of silver; and if these fail, he has recourse to the actual cautery, and, when the sloughs are very thick, so as to hinder the cautery from acting to a sufficient depth, he prefers thrusting into the sloughs down to the living flesh angular pieces of caustic potash at small distances from each other! (*Précis. Elem. des Mal. Chir. T.* 1, *p.* 151.) Surely, this must be far more torturing, and less certain of success, than removing the sloughs, and applying the cautery.

Though the actual cautery is generally admitted to be one of the most powerful means of stopping the progress of hospital gangrene, the surgeons of this country entertain a strong aversion to the practice; and I confess, that my own dislike to it is such as would always lead me to prefer any other treatment, from which equal efficacy would result. At the same time, it must be granted, that if the actual cautery will more certainly arrest some forms of hospital gangrene, than any other known applications, the surgeon's duty is to put out of the question his own prejudices against it, and consider only his patient's welfare. I am far from thinking, however, that, while there are such powerful caustics as the undiluted mineral acids, and a dressing so effectual as a solution of arsenic, it can often be absolutely necessary to employ red-hot irons.

The merit of having pointed out in modern times the great efficacy of Fowler's solution of arsenic, or the liquor arsenicalis of the London Pharmacopœia, as an application to phagedæna gangrænosa, belongs to Mr. Blackadder. In answer to the objection, that the external use of arsenic is not unattended with danger, he assures us, that he has heard but of one instance of hospital gangrene, in which any deleterious effects were supposed to arise from the absorption of the arsenic, and the patient in question was very soon cured of his uneasy, and possibly merely nervous symptoms". (*P.* 50.)

"The first thing to be attended to in every case of disease (says Mr. Blackadder) is *cleanliness*, which, if always of great importance, is, in this instance, indispensable. The surface of the body ought to be made, and kept perfectly clean, by means of the tepid bath, or otherwise by a plentiful use of soap; and the linen, and bed-clothes, should be frequently changed, particularly when soiled with matter from the sore." In order to make the sore perfectly clean, and free it from the viscous discharge, without producing considerable bleeding, and pain, Mr. Blackadder recommends two large tin hospital teapots to be filled with a weak solution of the subcarbonate of potass. One of these solutions is to be cold; the other tepid; because sometimes one, and sometimes the other, is found most agreeable to the patient's feelings, though the warm is the most effectual in cleansing the sore. The liquid is to be poured over the sore, and received into a basin, which ought to be immediately emptied into another vessel placed at a distance from the patient. During this ablution, the glutinous matter, which adheres to the sore, may be gently detached, by means of small dossils of fine tow, or lint, but these (says Mr. Blackadder) should never be used for two different patients, rigid ecomomy, on occasions such as this, being a very mistaken principle. In these cases, the use of sponges, (he justly observes) ought to be entirely laid aside, as they can seldom be used more than once with safety. When the sore has been thus cleaned, a fine piece of dry lint is to be spread over its surface, and gently pressed into all its depressions with the points of the fingers. When the lint is removed, a quantity of the discharge will be found adhering to it: and this operation must be repeated with fresh pieces of lint, until the surface of the sore is made perfectly clean and dry.

According to Mr. Blackadder, the solution of arsenic will generally be found strong enough, when diluted with an equal part of water; but, in slight cases, it answered, when weakened with twice its quantity of water; and, in a few examples, it was employed without being at all diluted. Several pieces of lint of the same shape as the sore, but a little larger, are to be prepared: one of these, soaked in the solution, is now to be applied to the cleaned surface of the sore, and renewed every fifteen or thirty minutes, according to the time in which it becomes dry. When the heat and inflammation are considerable, great relief will be derived from the frequent application of linen cloths moistened with cold water, which must be kept from weakening the arsenical solution by means of a small piece of oilskin laid over the pieces of lint. When the disease extends into the track of a gunshot wound, Mr. Blackadder uses a syringe for cleaning the sore, and introducing the solution. "A slip of fine lint, well soaked in the solution, may also be inserted by means of a probe, into the bottom of the wound; and when the openings are at no great distance from each other, and not in the immediate vicinity of the large nerves and blood-vessels, the lint may be drawn through the wound in the form of a seton. (*P.* 53.) When the pain, caused by the application, is very severe, and the constitution is irritable, and debilitated, Mr. Blackadder prescribes an opiate, though he remarks, that this practice will seldom be absolutely necessary. The morbid action in the sore is destroyed by the arsenical solution sooner, or later, in different cases: *the best plan is to continue the application, until an insensible, dark-coloured, dry slough occupies the whole surface of the sore; and until the patient is completely relieved from the burning and lancinating pain.*

After the slough is formed, Mr. Blackadder employs an ointment, composed of equal parts of the oil of turpentine, and the yellow resinous ointment, or of two parts of Venice turpentine to one of the resinous ointment. "These being melted and mixed together, are to be poured over the sore, as hot as the patient can possibly bear." A pledget of dry lint, or tow, and a bandage, are then applied; and this dressing may be renewed two or three times a day, the sore being each time carefully washed with the solution of potass. As soon as any part of the slough is loosened, Mr. Blackadder removes it with a pair of curved scissors. With the view of expediting the separation of the slough, he sometimes employs a linseed-meal poultice, which had the desired effect, but was found to be too relaxing. When it is used, therefore, Mr. Blackadder found it expedient, at each dressing, to touch the new granulations with the nitrate of silver.

After the detachment of the slough, Mr. Blackadder dresses the sore with the above-mentioned ointment cold, or with the addition of a small proportion of the subacetate of copper. The pledget of this ointment is covered with a piece of oilskin, lightly rubbed over with soap; and a firm bandage is applied to the whole limb. (See *Obs. on Phagedæna Gangrænosa, p.* 49, *&c.* 8vo. *Edinb.* 1818.) The author declares, that, after the introduction of the above treatment, (with the exception of stumps attacked with hospital gangrene) he never saw an instance in which the remedy failed, when applied in time and in a proper manner; that is, before the disease had made such progress as to preclude all rational hope of success from that or any other mode of treatment. (*P.* 23.)

In Dr. Rollo's treatise on Diabetes, published in 1797, the opinion is plainly stated, that the progress of hospital gangrene might be stopped by very active topical applications, and, in the same work, Mr. Cruickshank says, that "if an actual caustic were to be employed, we should have recourse to the strong nitrous acid." According to Mr. Blackadder, the oxygenated muriate of mercury and the nitrous acid were much recommended, and employed by surgeons in the 16th and 17th centuries, as escharotics, in cases of gangrene and foul ulcers. (*P.* 113.) Several army surgeons have informed me, that the undiluted nitrous acid was successfully used as an application to hospital gangrene in the military hospitals at Antwerp in the year 1815; but that other strong acids had an equally good effect. Dr. J. Thomson also notices, that "the application of caustic substances, such as the strong mineral acids, the solutions of potass, corrosive sublimate, and arsenic, seemed at Antwerp to arrest the progress of this sore, without exciting inflammation." (*Report of Observations made in the Military Hospitals in Belgium.*)

Delpech was informed by some British surgeons, belonging to the Anglo-Portugueze army in the Peninsula, that the muriatic acid was in common use in the hospitals of that army as a local application for checking the ravages of hospital gangrene, being employed in a diluted state for slight cases, and in a concentrated caustic form for others.

In St. Bartholomew's hospital, the undiluted nitric acid has been used with great success as a local application to phagedenic gangrenous ulcers, as may be seen by an interesting paper recently published by Mr. Welbank. (*Med. Chir. Trans. Vol.* 10.)

Pouteau, Dussassoy, Boyer, and Delpech, all bear testimony to the efficacy of the actual cautery, and they repeat the application of it, until the whole surface of the ulcer is converted into a firm hard eschar. Even the edges of the solution of continuity should not be spared—"*ils doivent etre torréfiés et rôtis pour ainsi dire.*" (*Boyer, Traité des Maladies Chir. T.* 1, *p.* 332.) The latter surgeon then covers the eschar with a thick stratum of bark moistened with turpentine. This application is to be removed in twenty-four, thirty-six, or forty-eight hours, and the surgeon is then to judge from the appearance of the flesh, and the quality of the discharge, whether a further repetition of the cautery will be necessary.

Pouteau. Œuvres Posthumes, T. 3, *published* 1783. *Dussassoy Dissertation et Observations sur la Gangrène des Hôpitaux, &c.* 8vo. *Genève,* 1788. *Moreau et Burdin, Essai sur la Gangrène Humide des Hôpitaux,* 1796. *Observations on the Putrid Ulcer, by L. Gillespie, in London Medical Journal, Vol.* 6, 1785. *Rollo on Diabetes,* 1797. *Sir Gilbert Blane on the Diseases of Seamen, Ed.* 3. 1797. *Trotter's Medicina Nautica, Vols.* 2 *and* 3, *published* 1799. *John Bell's Principles of Surgery, Vol.* 1, 1801. *Wolf Ploucquet, De Gangræna sic dicta Nosocomiorum, Tub.* 1802. *Leslie, De Gangræna Contagiosa. Edinb.* 1804. *Johnston, De Gangræna Contagiosa Nosocomiale, Edinb.* 1805. *J. Thomson's Lectures on Inflammation, p.* 456, *et seq. Edinb.* 1813, *and Report of Observations, made in the Military Hospitals of Belgium,* 8vo. *Edinb.* 1816. *J. Hennen, Principles of Military Surgery, p.* 210, *&c.* 8vo. *Edinb.* 1820. *C. J. M. Langenbeck, Neue Bibl.* 2 *B. p.* 611, *&c. Hanover,* 1820. *Mémoire sur la Complication des Plaies et des Ulcères, connue sous le nom de Pourriture d'hôpital, par J. Delpech,* 8vo. *Paris,* 1815. *Also Précis Elémentaire des Maladies Chir. T.* 1, *p.* 123, *&c. Paris.* 1816. *Brugmans und Delpech über den Hospitalbrand, übersezt mit Anmerkungen und Anhang von Kieser, Jennal,* 1815. *Boyer, Traité des Maladies Chir. T.* 1, *p.* 320, *Paris,* 1814. *Sketches of the Medical Schools of Paris by J. Cross, p.* 82, *London,* 1815. *H. Home Blackadder, Observations on Phagedæna Gangrænosa,* 8vo. *Edinb.* 1818, *which is unquestionably the best treatise on the subject, whether his sentiment about the disease being always, or nearly always, communicated by the direct application of the infectious matter to the parts, and not through the contagion in the air, be correct or not; or whether his opinion about the local nature of the disease in the beginning, and its invariable commencement with the local mischief, and not with constitutional symptoms, be liable to exceptions or not.* The rest of the subject of *Gangrene* is treated of in the article *Mortification.*

HYDRARGYRIA. A peculiar eruption occasioned by the use of mercury, and named in Dr. Bateman's synopsis *ecsema rubrum.* (See *Mercury.*)

HYDROCELE. (from ὕδωρ, water, and κηλη, a tumour.) The term *hydrocele,* if used in a literal sense, means any tumour containing water; but surgeons have always confined it either to a collection of fluid in the cellular membrane of the scrotum; in a cyst, or the common cellular texture, of the spermatic cord; or in the tunica vaginalis of the testicle.

The celebrated Dr. Alexander Monro of Edinburgh, and Mr. S. Sharp, were almost the only writers, before Mr. Pott, who sensibly and rationally explained the true nature of these diseases.

ANASARCOUS TUMOUR OF THE SCROTUM:

The *hydrocele by infiltration* of French writers; *hydrocele œdematodes;* is most frequently only a symptom of a dropsical habit, and very often accompanies both anasarca and the particular collection within the abdomen, called ascites. Mr. Pott describes it as "an equal, soft tumour, possessing every part of the cellular membrane, in which both the testicles are enveloped, and consequently it is generally as large on one side as on the other; it leaves the skin of its natural colour; or, to speak more properly, it does not redden or inflame it; if the quantity of water be not large, nor the distention great, the skin preserves some degree of rugosity; the tumour has a doughy kind of feel; easily receives, and for a while retains, the impression of the fingers; the raphe, or seam, of the scrotum divides the swelling nearly equally; the spermatic process is perfectly free, and of its natural size; and the testicles seem to be in the middle of the loaded membrane. This is the appearance when the disease is in a moderate degree. But if the quantity of extravasated serum be large, or the disease farther advanced, the skin, instead of being wrinkled, is smooth, tense, and plainly shows the limpid state of the fluid underneath: it is cold to the touch, does not so long retain the impression of the finger, and is always accompanied with a similar distention of the skin of the penis; the preputium of which is sometimes so enlarged, and so twisted and distorted, as to make a very disagreeable appearance. These are the local symptoms: to which it may be added, that a yellow countenance, a loss of appetite, a deficiency of urinary secretion, swelled legs, a hard belly, and mucous stools, are its very frequent companions."

As the cellular membrane on one side of the scrotum is a continuation of that which is situated on the other, and both freely communicate; the accounts delivered by certain authors of the possibility of this species of hydrocele being confined to one side of the scrotum is not credited by some modern surgeons. (See *Dict. des Sciences Med. T.* 22, *p.* 193.) At all events, such a case is extremely rare, and, when it happens, is probably induced by the irritation of the urine in infants, or of the friction of the clothes in old persons, only acting upon a part of the scrotum; for occasionally, though not often, the disease is acknowledged to proceed from these local causes. (*Vol. et loco cit.*)

The cure of the original disease, when it arises from constitutional causes, comes within the province of the physician, and requires a course of internal medicine: but sometimes the loaded scrotum and penis are so troublesome to the patient, and in such danger of mortification, that a reduction of their size becomes absolutely necessary: and at other times, a discharge of the redundant extravasated serum is ordered as an assistant to the internal regimen. As Mr. Pott observes, the means of making this discharge are two, viz. puncture and incision: the former is made with the point of a lancet; the latter with the same instrument, or with a knife. According to the same author, and indeed every man of experience, wounds in anasarcous, or dropsical habits, are apt to inflame, very difficultly brought to suppuration, and "often prove gangrenous, in spite of all endeavours to the contrary. But the larger and deeper the wounds are, the more probable are these bad consequences. Simple punctures with the point of a lancet, are much less liable to be attended by them than any other kind of wound; they generally leave the skin easy, soft, cool, and uninflamed, and in a state to admit a repetition of the same operation if necessary. Incisions create a painful, crude, hazardous sore, requiring constant care. Punctures seldom produce any uneasiness at all; and stand in need of only a superficial pledget for dressing.

It is further explained by the same author, that as the cavities of the cellular membrane of the scrotum all communicate together, a small puncture serves, as well as a large incision, for the discharge of the fluid contained in them, and consequently upon this ground no reason exists for making any extensive, painful, and hazardous wound.

With respect to the practice of making punctures, in cases of anasarcous hydrocele, I think that it should always be avoided as much as possible, because it sometimes happens, that the slightest pricks of the lancet occasion sloughing. The method should only be adopted, when the distention of the skin of the scrotum is such, as absolutely to require the fluid to be discharged. Care should also be taken not to multiply the punctures unnecessarily, nor to let them be made too near together. (See *Dict. des Sciences Med. T.* 23, *p.* 195.)

When the œdematous state of the scrotum is not the effect of a general constitutional disease, but proceeds entirely from a local cause, such as friction, or the irritation of the urine, the mode of treatment consists in the removal of the cause, the use of astringent lotions, and the exhibition of a dose of salts. In elderly subjects, the wearing of a bag-truss is recommended for the prevention of the complaint.

HYDROCELE OF THE SPERMATIC CORD

Is of two kinds; the first is described as an œdematous affection, extending to more or less of the cellular substance around the spermatic vessels, and sometimes named the *encysted hydrocele of the cord;* the second form of the disease is that in which the fluid is collected in a particular cavity, or cyst, which has no communication with the cavities of the common cellular substance of the cord. This case is denominated accordingly, the *encysted hydrocele of the cord.* That the cellular membrane of the cord is often distended with an aqueous fluid, when the scrotum is anasarcous and the habit dropsical, cannot admit of doubt, and hence it is a frequent attendant on the case, which has been described as the hydrocele œdematodes.

But as I have never seen an instance, in which such disease was restricted to the cellular texture of the cord, I am led to suppose that it is a very uncommon case. The following is said by Mr. Pott to be the state of the disease, while of moderate size. The scrotal bag is free from all appearance of disease; except that when the skin is not corrugated, it seems rather fuller, and hangs rather lower on that side than on the other, and if suspended lightly on the palm of the hand, feels heavier: the testicle, with its epididymus, is to be felt perfectly distinct below this fulness, neither enlarged, nor in any manner altered from its natural state: the spermatic process is considerably larger than it ought to be, and feels like a varix, or like an omental hernia, according to the different size of the tumour: it has a kind of pyramidal form, broader at the bottom than at the top: by gentle and continued pressure it seems gradually to recede or go up, but drops down again immediately upon removing the pressure; and that as freely in a supine, as in an erect, posture: it is attended with a very small degree of pain or uneasiness; which uneasiness is not felt in the scrotum, where the tumefaction is, but in the loins.

"If the extravasation be confined to what is called the spermatic process, the opening in the tendon of the abdominal muscle is not at all dilated, and the process passing through it may be very distinctly felt; but if the cellular membrane, which invests the spermatic vessels within the abdomen, be affected, the tendinous aperture is enlarged; and the increased size of the distended membrane passing through it, produces to the touch a sensation not very unlike that of an omental rupture."

While it is small, it is hardly an object of surgery, and may be kept from being troublesome by means of a suspensory; but when it is large, it is very inconvenient both from size and weight, and according to Pott, the only method of cure which it admits, is far from being void of hazard. The plan is to make a free incision into the swelling. It must be confessed, with a modern writer, that these observations on the diffused hydrocele of the cord by Mr. Pott, are far from being satisfactory, and the symptoms, by which he made up his mind to lay open the disease, were but of an equivocal description, and might have arisen from cases of another nature. (See *Dict. des Sciences Med. T.* 22, *p.* 215.)

THE ENCYSTED HYDROCELE OF THE SPERMATIC CORD

Is a complaint by no means infrequent, especially in children. It was very well known to many of the ancients, and has been accurately described by Albucasis, Celsus, Paulus Ægineta, &c. When Mr. Pott says, that the disease is not infrequent, it ought to be understood, that its frequency, though much greater, than that of the diffused hydrocele of the cord, considered as a distinct disease independent of general anasarca, is not at all equal to that of the hydrocele of the tunica vaginalis. Richerand has calculated, that the average proportion of encysted hydroceles of the cord to those of the latter description, is not more than as 1 to 200. (*Nosogr. Chir. T.* 4, *p.* 262, *Ed.* 4.) According to Mr. Pott, the swelling is mostly situated at the middle part of the cord, between the testicle and groin, and is generally of an oblong figure; whence it has by some people been compared to an egg, by others to a fish's bladder. Whether it be large or small, it is generally pretty tense, and consequently the fluctuation of the water within it, not always immediately or easily perceptible. It gives no pain, nor (unless it be very large indeed) does it hinder any necessary action. It is perfectly circumscribed; and has no communication, either with the cavity of the belly above, or that of the vaginal coat of the testicle below it. The testis and its epididymis, are perfectly and distinctly to be felt below the tumour, and are absolutely independent of it. The upper part of the spermatic process in the groin is most frequently very distinguishable. The swelling does not retain the impression of the fingers; and when lightly struck upon, sounds as if it contained wind only. It undergoes no alteration from change of the patient's posture; it is not affected by his coughing, sneezing, &c. and it has no effect on the discharge per anum.

The two diseases with which this kind of hydrocele is most likely to be combined, are, an hydrocele of the tunica vaginalis testis, and a true hernia.

"One mark, or characteristic of an hydrocele of the tunica vaginalis testis is, that it possesses and distends the inferior part of the scrotum; and that the testicle being nearly (though not absolutely) surrounded by the water, it very seldom happens that the former can be clearly and plainly distinguished by the fingers of an examiner; whereas, in the encysted collection, in the membranes of the cord, the tumour is always above the testicle, which is obvious and plain to be felt below it.

"Another circumstance worth attending to is, that although the fluid in a hydrocele of the vaginal coat does so nearly surround the testis as to render it often not very easy to be distinguished, yet the different parts of the tumour have always a very different feel: for instance, in all those points where the vaginal tunic is loose, and unconnected with the tunica albuginea, the tumour is soft and compressible, and gives a clear idea of the contained fluid; but where these two coats are continuous, or make one and the same membrane, and have no cavity between them (which is the case on the middle and posterior part) there will always be found a hardness and firmness very unlike to what is to be found in all those places where the distance between the two tunics leaves room for the collection of a fluid; now the hydrocele of the cord being formed in the mere cellular membrane of it, is the same to the touch in all the parts of the tumour, and feels like a distended bladder through every point of it.

"The free state of the upper part of the spermatic process, while the tumour is forming below; the gradual accumulation of the fluid, and consequently the gradual growth of the swelling; the indolent and unaltering state of it; its being incapable of reduction, or return into the belly from the first; its being always unaffected by the patient's coughing or sneezing; and the uninterrupted freedom of the fecal discharge per anum, will always distinguish it from an intestinal hernia; and he who mistakes it for an omental one, must be very ignorant, or very heedless."

Mr. Pott met with an encysted hydrocele situated so high toward the groin, as to render the perception of the spermatic vessels very obscure, or even impracticable; but then, the state and appearance of the testicle, and the absence of every symptom proceeding from confinement of the intestinal canal, were sufficient marks of the true nature of the complaint. Several writers describe this kind of hydrocele, as in fact a common encysted tumour, formed in the cellular substance, between the vas deferens and spermatic vessels. (*Delpech, Précis Elem. des Mal. Chir. T.* 3, *p.* 464.) Yet, since ordinary encysted swellings are very difficult to disperse, there is probably some difference between the two affections, at least, if the observation of Mr. Pott be correct, that in young children, the encysted hydrocele of the cord frequently dissipates in a short time, especially if assisted by warm fomentation, and an open belly.

If it be not absorbed, "the point of a lancet will give discharge to the water; and in young children, will most frequently produce a cure: but in adults, the cyst, formed by the pressure of the fluid, does sometimes become so thick, as to require division through its whole length; which operation may in general be performed with great ease, and perfect safety." Mr. Pott says, in general, because it is most frequently so: though he has even seen this, slight as it may seem, prove troublesome, hazardous, and fatal. (See *Pott on Hydrocele.*)

The late Sir J. Earle proposed treating this case in the same way as the hydrocele of the tunica vaginalis, viz. by an injection of red wine and water; which method is often successful. (*On Hydrocele, p.* 154, *edit.* 2.) However, the cure of an encysted hydrocele of the spermatic cord, by means of an injection, is generally regarded by modern surgeons, as less certain and advantageous, than the excision of a part of the cyst. The operation which is described by Bertrandi, Mr. Hey, Richerand, &c. consists in cutting down to the cyst, and removing the forepart of it, while the portion, closely attached to the cord, is to be allowed to remain. For additional observations on this species of hydrocele. (See the *First Lines of the Practice of Surgery, Vol.* 2, *p.* 121.)

HYDROCELE OF THE TUNICA VAGINALIS.

If the quantity of limpid fluid, which naturally moistens the surface of the tunica albuginea and the inside of the tunica vaginalis, be secreted in an undue quantity, or if regular absorption of it be by any means prevented, it will gradually accumulate, and distend the cavity of the latter membrane, so as to form the present species of hydrocele. The case in which the fluid is supposed to descend, either partly or entirely from the cavity of the abdomen, in consequence of the communication not being shut up in the usual time, between the cavity of the peritoneum and that of the tunica vaginalis, is well known to surgeons under the appellation of a congenital hydrocele; a disease, of which particular notice has been taken in the 2d Vol. of the last edition of the *First Lines of Surgery*, 8*vo. Lond.* 1820, and to which I shall therefore very briefly advert in this article. Hydrocele of the vaginal coat is a disease from which no time of life is exempt; not only adults are subject to it, but young children are frequently afflicted with it: and infants sometimes born with it. (*Pott.*) And it is remarked to be common in old men, and persons who ride a good deal on horseback. (*Delpech Précis Elem. des Mal. Chir. T.* 3, *p.* 177.)

The causes of hydrocele of the tunica vaginalis can scarcely be said to be at all understood; and when Mr. Pott observes, that whatever tends to increase the secretion of fluid into the cavity of that membrane, beyond the due and necessary quantity, or to prevent its being taken up, and carried off by the absorbent vessels. must contribute to the production of the disease, nearly as much is stated, as can be advanced with safety in the present state of our knowledge. Ruysch had a suspicion, that this hydrocele might arise from a varicose state of the spermatic veins; but though Mr. Pott acknowledges that these vessels are very frequently found varicose in patients afflicted with this disorder, he was unable to pronounce what real foundation might exist for the foregoing conjecture, or whether the varicose state of the spermatic veins were a cause, or an effect of the hydrocele. In most instances, the accumulation of fluid takes place without any evident cause; though, in a few cases, it has appeared to be the effect of a contusion, or of rough long-continued friction of the scrotum. The disease is observed to affect persons of the best health, and most robust constitutions, as well as others, and its existence seems quite unconnected with dropsy, or debility. In short, it may be regarded as a disease entirely of a local nature. As Mr. Pott observes, its production is so slow and gradual, and at the same time so void of pain, that the patient seldom attends to it, until it has arrived to some size. Not but that it sometimes is produced very suddenly; and in a very short space of time attains considerable magnitude.

In general, at its first beginning, the tumour is rather round; but as it increases, it frequently assumes a pyriform kind of figure, with its larger extremity downward; sometimes it is hard, and almost incompressible; so much so, that, in some few instances, it has been mistaken for an induration of the testicle: at other times, it is so soft and lax, that both the testicle, and the fluid surrounding it, are easily discoverable. It is perfectly indolent in itself; though its weight sometimes produces some small degree of uneasiness in the back. According to Mr. Pott, the transparency of the tumour is the most fallible and uncertain sign belonging to it: it is a circumstance, says he, which does not depend upon the quantity, colour, or consistence of the fluid constituting the disease, so much as on the uncertain thickness, or thinness of the containing bag, and of the common membranes of the scrotum.

If they are thin, the fluid limpid, and the accumulation made so quick as not to give the tunica vaginalis time to thicken much, the rays of light may sometimes be seen to pass through the tumour: but this is accidental, and by no means to be depended upon. The fluid is most frequently of a pale yellow, or straw-colour; sometimes it is inclined to a greenish cast; sometimes it is dark, turbid, and bloody; and sometimes it is perfectly thin and limpid.

With respect to Mr. Pott's remarks on the transparency of the swelling, as a symptom of hydrocele, they are correct, inasmuch as the absence of this sign is no proof, that the disease is not of this nature; since thickness of the tunica vaginalis, and, as ought also to have been admitted, the opaque quality of the fluid, sometimes prevent the rays of a candle from passing through the swelling. But, on the other hand, it should have been explained by Mr Pott, that *when the transparency is present, it is one of the surest marks of this species of hydrocele.*

It is next noticed by Mr. Pott, that in the beginning of the disease, if the water has accumulated slowly, and the tunica vaginalis is thin and lax, the testicle may easily be perceived; but if the said tunic be firm, or the water accumulated in any considerable quantity, the tetis cannot be felt at all. In most cases, the spermatic vessels may be distinctly felt at their exit from the abdominal muscle, or in the groin; which will always distinguish this complaint from an intestinal hernia. But, in a few examples, the vaginal coat is distended so high, and is so full that it is extremely difficult, nay, almost impossible, to feel the spermatic cord: and the same kind of obscurity is sometimes occasioned by the addition of an encysted hydrocele of the cord; or by the case being combined with a true enterocele.

In a hydrocele of the tunica vaginalis, the swelling is first noticed at the lower part of the scrotum, whence it ascends in front of the testicle and spermatic cord. The progress of the disease is generally so slow, that six or even eighteen months elapse, before the tumour approaches the abdominal ring. And, among other characters of the case, are to be noticed the disappearance of the corrugations of the scrotum by the effect of the distention; inclination of the raphe to the opposite side; and the possibility of feeling a fluctuation, when the fingers of one hand are applied to one side of the tumour, and the surgeon slightly taps with the fingers of his other hand upon an opposite point of the swelling.

In the hydroceles of children, the testis occupies a lower situation, than the the same organ in the hydroceles of adult persons, and the swelling passes further up towards the abdominal ring.

It is well explained by Mr. Pott, that the tunica vaginalis and tunica albuginea, are so inseparably united at the posterior and superior, or rather the posterior and middle part of the tumour, that no fluid can collect between them; and therefore, the fingers of an intelligent examiner must immediately discover here the firmness and hardness arising from the union of these parts; while in all others, the two membranes being unconnected, and affording a void space for the collection of water, the fluctuation of it will always be distinguishable.

"This (says Pott) must for ever discriminate the simple hydrocele of the tunica vaginalis from the anasarcous swelling of the scrotum; from the encysted hydrocele of the cord; and from the intestinal hernia. The first is every where equal, tumid, and soft; and every where equally receives and retains the impression of the fingers; the second, though circumscribed, not very compressible, and affording the sensation of fluctuation, yet does not pit, and is alike to the touch in all parts of it; and in the third, if the testicle be distinguishable at all, it is found at the inferior part of the whole tumour."

A collection of fluid in the tunica vaginalis, complicated with a scirrhous or chronic induration and enlargement of the testicle, is well known under the name of *hydro-carcocele;* a case, which should be carefully discriminated from a simple hydrocele, "one of the marks of the latter being the natural, soft, healthy state of the testicle: and the characteristic of the former being its diseased and indurated enlargement."

Mr. Pott does not mean that, in a true simple hydrocele, the testicle is never altered from its natural state. He admits the contrary, and that it is often enlarged in size, and relaxed in structure, and that the spermatic vessels are frequently varicose. But, the testicle is never indurated. These two diseases are extremely unlike each other, and require very different treatment. That which would cure a simple hydrocele, would dangerously aggravate the hydro-sarcocele.

Mr. Pott observes, that "it may, and does sometimes become necessary to let out the water from the vaginal coat of a testicle, in some degree diseased; but this should always be done with caution, and under a guarded prognostic; lest the patient be not only disappointed, by not having that permanent relief, which, for want of better information, he may be induced to expect; but be also (possibly) subjected to other unexpected inconveniences from the attempt.

"When the disease is a perfect, true, simple hydrocele, the testicle, though frequently somewhat enlarged, and perhaps loosened in its vascular texture, is nevertheless sound, healthy, and capable of executing its proper office; neither is the spermatic cord any way altered from a natural state, except that its vessels are generally somewhat dilated; neither of which circumstances are objections either to the palliative or radical cure of the disease. But in those disorders, which in some degree resemble this, the case is different; either the testicle, or spermatic cord, or both, bearing evident marks of a diseased state."

According to Richerand, a hydrocele may be known from a sarcocele by the following circumstances: in a sarcocele, the tumour mostly retains the shape of the testicle, being oval and a little flattened at the sides, and its size becomes considerable in a short time, without ascending so near the abdominal ring, as a hydrocele does, when of the same magnitude. A large hydrocele leaves no interspace between that opening and the tumour, so that it is difficult to take hold of, and lift up the spermatic cord; but, in a sarcocele, there is always a space between the tumour and the ring, where the cord can be distinctly felt. Lastly, in a sarcocele, the tumour is always opaque, and its weight, in reference to its size, much more considerable, than that of a hydrocele. (*Nosogr. Chir. T.* 4, *p.* 267, *Ed.* 4.) The hardness is not a symptom which can be trusted alone, as a criterion of a diseased testicle; for, when a hydrocele is extremely distended, it often feels so indurated as to deceive practitioners of great experience, and a thickened, hardened state of the tunica vaginalis may facilitate the mistake. In some instances of *hydro-sarcocele*, the nature of the disease sometimes remains questionable, until the evacuation of the fluid gives the surgeon a fair opportunity of ascertaining the diseased state of the testicle.

The complication of an hydrocele of the tunica vaginalis with an encysted one of the spermatic cord, may generally be known by the swellings having begun at two different points, and by a kind of constriction between them. The latter symptom, however, is not infallible, because the tunica vaginalis of a common hydrocele is sometimes more or less contracted at the middle of the tumour, which is thus made to appear as if there were two distinct pouches.

The size of a hydrocele, and the thickness of the tunica vaginalis, are generally in a ratio to the time, which the disease has continued. Sometimes the latter membrane acquires nearly a cartilaginous hardness; and portions of it have been found in an ossified state; the only circumstance, in which any free excision of it is now accounted necessary. A hydrocele has been known to contain four pints of fluid. (*Voigtel, Handbuch der Pract. Anat. B.* 3, *p.* 388.)

METHODS OF CURING THE HYDROCELE OF THE VAGINAL COAT.

A hydrocele is by no means a dangerous complaint, though its weight and size are a disagreeable incumbrance, and the patient is always obliged to wear a bag truss, in order to prevent a painful extension of the spermatic cord. Troublesome excoriations are also frequently caused by the friction of the tumour against the inside of the thigh; and when the swelling is very large, it draws over itself the integuments of the penis, which appears buried, as it were, in the tumour, and its functions are seriously interrupted. Hence, the greater number of patients are very anxious for relief.

"The methods of cure (says Pott) though various, are reducible to two, (viz.) the palliative, or that which pretends only to relieve the disease in present, by discharging the fluid; and the radical, or that which aims at a perfect cure, without leaving a possibility of relapse. The end of the former is accomplished by merely opening the containing bag in such manner as to let out the water: *that of the latter cannot be obtained, unless the cavity of that bag be abolished, and no receptacle for a future accumulation left;* (a proposition, on which the observations of Mr. Ramsden and Mr. Wadd, published since Mr. Pott's time, have thrown a degree of doubt.) One may be practised at all times of the patient's life, and in *almost* any state of health and habit: the other lies under some restraints and prohibitions; arising from the circumstances of age, constitution, state of the parts, &c.

"The operation, by which the fluid is let out, is a very simple one. The only circumstances requiring our attention in it, are, the instrument wherewith we would perform it; and the place or part of the tumour, into which such instrument should be passed.

"The two instruments in use, are the common bleeding-lancet, and the trocar.

"The former having the finer point, may possibly pass in rather the easier, (though the difference is hardly perceptible) but is liable to inconveniences, to which the latter is not. The trocar, by means of its cannula, secures the exit of the whole fluid without a possibility of prevention; the lancet cannot. And therefore it frequently happens when this instrument is used, either that some of the water is left behind, or that some degree of handling and squeezing is required for its expulsion; or, that the introduction of a probe, or a director, or some such instrument, becomes necessary for the same purpose. The former of these may in some habits be productive of inflammation: the latter prolongs what would otherwise be a short operation, and multiplies the necessary instruments; which, in every operation in surgery, is wrong. To which it may be added, that if any of the fluid be left in the vaginal coat, or insinuates itself into the cells of the scrotum, the patient will have reason to think the operation imperfect, and to fear, that he shall not reap even the temporary advantage which he expected. The place where this puncture ought to be made, is a circumstance of much more real consequence; the success of the attempt, the ease, and even sometimes the safety of the patient, depending upon it.

"All the anterior and lateral parts of the vaginal coat are loose and detached from the albuginea; in its posterior and superior part, these two tunics make one; consequently the testicle is, as it were, affixed to the posterior and superior part of the cavity of the sac of an hydrocele; and consequently, the water or fluid can never get quite round it. This being the state of the case, the operation ought always to be performed on that part of the tumour, where the two coats are at the greatest distance from each other, and where the fluid must therefore be accumulated in the largest quantity; and never on that part of it where the fluid cannot possibly be. The consequence of acting otherwise, must not only produce a disappointment, by not reaching the said fluid; but may prove, and has proved, highly and even fatally mischievous to the patient.

"After performing this operation, present practitioners content themselves with a bit of lint and a plaster; and if the scrotum has been considerably distended, they suspend it in a bag truss; and give the patient no farther trouble.

"In most people (continues Pott) the orifice thus made heals in a few hours, (like that made for blood-letting;) but in some habits and circumstances, it inflames and festers; this festering is generally superficial only, and is soon quieted by any simple dressing; but it sometimes is so considerable, and extends so deep, as to affect the vaginal coat, and by accident produce a radical cure. Mr. Pott has also seen it prove still more troublesome, and even fatal; but then the circumstances both of the patient, and of the case, have been particular.

"Wiseman and others have advised deferring the puncture, till a pint of fluid has collected. When there is a sufficient quantity, however, to keep the testicle from the instrument, there can be no reason for deferring the discharge; and the single point on which this argument ought to rest, is this: Whether the absorbent vessels, by which the extravasation should be prevented, are more likely to reassume their office, while the vaginal coat is thin, and has suffered but little violence from distention; or after it has been stretched and distended to ten or perhaps twenty times its natural capacity; and by such distention is (like all other membranes) become thick, hard, and tough? Mr. Pott thinks the probability so much more on the side of the former, that he should never hesitate a moment about letting out the water, as soon as he found that the puncture could be made securely. And from what has happened within the small circle of his own experience, he is inclined to believe, that if it was performed more early than it generally is, it might sometimes prevent the return of the disease."

The foregoing passage deserves to be particularly recollected, because it evidently implies a belief by Mr. Pott himself, that, under certain circumstances, a radical cure may be effected, though the cavity of the tunica vaginalis be not obliterated; an opinion since promulgated, as I have already said, by Mr. Ramsden, Mr. Wadd, and Mr. Kinder Wood. Indeed, it appears probable, that generally when a hydrocele is permanently cured, by means of such external applications, as do not excite inflammation, but operate by quickening the action of the absorbent vessels, the cavity of the tunica vaginalis is not destroyed; and there can be but little doubt of the same thing, whenever what is termed a spontaneous cure happens, as it sometimes does in young subjects. But, unless the fact were demonstrated by dissection, I should not believe that the cavity is not annihilated, after the completion of a radical cure by any of the methods, calculated to excite inflammation of the tunica vaginalis and tunica albuginea.

The palliative cure should in general be performed at least once on those, who determine to undergo a radical one, as it gives an opportunity of examining the state of the testis, and also of permitting the cavity to be filled again only to such a size, as may be thought to be best calculated to ensure success in any future operation. (*Sir J. Earle on Hydrocele, p.* 13, *ed.* 2.)

Upon the subject of performing the operation of tapping hydroceles, Professor Scarpa gives us some useful cautions. The analogy, which exists between large scrotal herniæ and hydroceles of considerable size, led this writer to suspect, that, in the latter disease, the displacement and separation of the vessels of the spermatic cord from each other might also happen. Careful investigations, made upon the dead subject, fully justified the conjecture. In all considerable hydroceles, he found the spermatic vessels so displaced and separated, that the artery and vas deferens were ordinarily situated on one side of the tumour, and the veins on the other. Sometimes these vessels all extended over the lateral parts of the tumour, as far as its anterior surface, principally towards the bottom.

It is well known, that in many instances, the operation of puncturing a hydrocele has been followed by a large extravasation of blood within the tunica vaginalis; but Scarpa informs us, that until lately, he was unacquainted with any case of this kind, which was well detailed and authentic enough, to be cited as an example of injury of the spermatic artery in the puncture of a hydrocele. This learned Professor, however, has had such a fact recently communicated to him by Gasparoli, a distinguished surgeon of Pallanza, who, in introducing the trocar into the lower part of the swelling, had the misfortune to injure the spermatic artery, and the patient was afterward castrated. The wound of this vessel was most clearly proved by the particulars of the case, as detailed in Scarpa's work, to which I must refer the reader.

From the accurate knowledge, (says Scarpa) which we now have upon this pathological point, such an accident may be avoided, by observing the rules, which are elsewhere given for opening the sac of a very large scrotal hernia. In this last operation, as well as that of puncturing an old and voluminous hydrocele, care must be taken to introduce the instrument at a considerable distance from the bottom of the tumour, that is to say, a little below its middle part, and on a line, which would divide the swelling longitudinally into two perfectly equal parts. Experience proves, that for the purpose of completely emptying an hydrocele, it is unnecessary to make the puncture very near the bottom of the tumour. The corrugation of the scrotum, and a slight pressure, made by the surgeon's hand, will suffice for discharging all the fluid contained in the tunica vaginalis, even when the puncture is made at the middle part of the swelling. (*Scarpa, Traité des Hernies, p.* 64—68.) On account of the lower situation of the testicle in the hydrocele of a child, than in that of a grown-up person, these directions of Scarpa will also be of value.

RADICAL CURE OF THIS HYDROCELE.

Besides the employment of external applications, wherewith a permanent cure has occasionally been accomplished, as related in my other work, six different operations have been practised for the same purpose; viz. incision; excision; the application of caustic; the introduction of a tent; the employment of a seton, and injecting some stimulating fluid into the cavity of the tunica vaginalis.

The principle, on which the success of every plan of this kind is commonly believed to depend, is the excitement of such a degree of inflammation in the tunica vaginalis, and tunica albuginea, forming the cavity which contains the water, as shall end in a mutual and general concretion of those membranes with each other, by which it is evident, the receptacle for a future accumulation of fluid is completely obliterated.

All the above plans are not equally eligible. Some of them, indeed, are now quite exploded; and some, which are still practised by a few, are not more successful, though certainly more severe, than one, which will be presently recommended; while others are very uncertain in their effect, as well as painful.

Incision.

Making an incision so as to lay open the cavity containing the fluid, is the most ancient method, being described by Celsus. Paulus Æginета says, the incision is to commence at the middle of the tumour, and be carried to the upper part of it, in a line parallel to the raphe. This incision is only to go through the integuments; the bag, which contains the water, is then to be opened, and part of the sides of the sac taken away. A director is next to be introduced, and a division of the tunica vaginalis made to the bottom of the swelling. The cavity is afterward to be dressed with lint, and healed by granulations. Hildanus, Dodonæus, Wiseman, Cheselden, Heister, and Sharp, all coincide in stating the dangerous and even fatal consequences sometimes following this mode. Mr. B. Bell, who preferred this operation to every other one, acknowledges, that he has seen it produce great pain and tension of the abdomen, inflammation, and fever. Pott observes, that it can never be said to be totally void of danger, and that it bears the appearance of an operation of some severity. This eminent surgeon abandoned the method, during the last twenty-six years of his life. Severe as it is, it has also been known to fail, as Sabatier and Earle have confirmed.

Excision.

Albucasis gave the first clear account of this operation, though Celsus has certainly mentioned removing some of the sac. White and Douglas used to adopt this method. The latter advises making two incisions, so as to form an oval, from the upper to the lower part of the tumour; dissecting off the oval piece of the scrotum, and then making an opening into the sac, and enlarging it with scissors. The tunica vaginalis was next to be entirely cut away, close to where it was connected with the spermatic vessels. The cavity was afterward filled with lint. Sir James Earle justly notices, that this plan must have been tedious, exquisitely painful in the performance, and, as subsequently treated, attended with violent and dangerous symptoms. In modern days, excision is only sanctioned, when the tunica vaginalis is more or less in an ossified state, for a mere thickening of it does not prevent the success of milder plans of treatment. With respect to a mode of excision, recently proposed by Mr. Kinder Wood, it differs entirely from the ancient method, inasmuch as it is perhaps the mildest of every plan yet suggested for the radical cure, since it simply consists in puncturing the hydrocele with an abscess lancet, drawing out a little bit of the sac with a tenaculum, and cutting it off. (See *Med. Chir. Trans. Vol.* 9, *p.* 33.) But, further experience is requisite to determine, whether this very easy plan is as certain as that with an injection. Whether the cavity is obliterated or not, as Mr. Kinder Wood himself believes, appears also still questionable.

Caustic.

Paulus Ægineta advises destroying the skin with a cautery of a particular form, dissecting off the eschar, and then cauterizing the exposed membrane. Guido di Cauliaco is, perhaps, the first who described the application of caustic for the cure of hydrocele. Wiseman practised this method. Dionis advises it; but De la Faye and Garengeot make objections to it. Mr. Else has left the best account of the manner of using caustic. He recommends laying "a small caustic upon the anterior and inferior part of the scrotum, which it is intended to affect, and, if possible, penetrate through the tunica vaginalis."

The objections to the employment of caustic are, its causing an unnecessary destruction of parts, and producing a tedious painful sore. The action of caustic can never be so regulated as to make an opening with certainty through the tunica vaginalis, so that either its application must sometimes be repeated, or else a lancet, or trocar, used after all. Its success is also less sure, than that of an injection; but, it is preferable to all the other methods, except this latter, the modification of excision proposed by Mr. K. Wood, and, perhaps, the seton.

Tent.

This is first mentioned by Franco. The operation consists in making an opening into the tunica vaginalis, and keeping the wound open with a tent of lint, linen, or sponge, so as to make the cavity suppurate, in which the water was contained. Paré, Guilleman, Covillard, Ruysch, Heister, and Marini, have all described the plan with some variations, one of which consisted in smearing the tents with irritating substances. Dr. A. Monro senior devised the plan of keeping a cannula in the tunica vaginalis; so as to bring on a cohesion of the parts without suppuration. Fabricius ab Aquapendente, however, has made allusion to some surgeons before his time, who used to keep the wound open a few days with a cannula. Mr. Pott tried the cannula, but found it very inconvenient, as its inflexibility hurt the testis whenever the patient moved with inattention, and consequently, he preferred a tent, or bougie, though he speaks of the plan as a very uncertain one.

Of late, Baron Larrey, in consequence of having seen several instances, in which the symptoms, following the use of an injection, were violent, and one case, in which a fatal peritonitis was produced, has recommended exciting the necessary degree of inflammation by keeping a short piece of an elastic gum catheter in the puncture, which instrument also serves afterward to let any fluid escape from the tunica vaginalis. (*Mém. de Chir. Militaire, T. 3, p. 409, &c.*) This author, of course, speaks of the plan as having fully answered his expectations; but, I much doubt whether it has any particular superiority over several of the former methods of employing the tent; methods, which the wisdom, arising from experience, has long since rejected.

Seton.

Was first mentioned by Guido di Cauliaco, in 1498, as a means of curing the hydrocele. In modern times, Pott preferred it to every other method, if we except injection, of which, according to Sir J. Earle, he expressed his approbation before his decease. Mr. Pott found, that the best mode of making the seton was as follows. He employed three instruments: the first was a trocar, the cannula of which was about one-fourth of an inch broad. The second was what he called the seton-cannula, which was made of silver, was just small enough to pass with ease through the cannula of the trocar, and five inches long. The third instrument was a probe six inches and a half long, having at one end a fine steel trocar point, and, at the other, an eye, which carried the seton. The seton consisted of so much white sewing silk, as would just pass easily through the cannula, and yet fill it. The thickness of the seton, however, was not so great in the latter part of his practice. Having pierced the inferior and anterior part of the tumour with the trocar, withdrawn the perforator, and discharged the water, Mr. Pott used to pass the seton-cannula through that of the trocar, to the upper part of the tunica vaginalis, so as to be felt there. The probe, armed with the seton, was next conveyed through the latter cannula, and its point pushed through the upper part of the tunica vaginalis, and scrotum. The silk was then drawn through the cannula, until a sufficient quantity was brought out of the upper orifice. The two cannula being withdrawn, the operation was finished.

Injection.

Dr. Monro attributes the first use of injections for the radical cure of hydroceles to an army-surgeon of his own name, who employed spirits of wine. This produced a cure; but the inflammation was so violent, that he afterward tried a milder injection, which consisted of wine. However, Lambert, in his *Œuvres Chir.* published at Marseilles, early in the seventeenth century, advised injecting a solution of sublimate in lime water, and he has related cases of success. Mr. S. Sharp also made trial of spirit of wine, which cured the hydrocele, but not without causing dangerous symptoms, and two subsequent abscesses in the scrotum. (*Operations of Surgery.*) Douglas, Le Dran, and Pott, all disapprove of injections in their works; though Sir James Earle informs us, that the latter lived to alter his opinion on the subject.

The violence of the inflammatory symptoms, consequent to the first employment of injections for the radical cure of hydroceles, arose from the fluids used being too irritating. Sir James Earle, at last, preferred wine for several reasons. He found, that it had been used with success in France; its strength is never so great as to render it unsafe; and it may be readily weakened. This injection, in short, produces less pain than any other mode of cure, does nothing more than is intended, and is as certain as any plan.

I have commonly used (says Sir James

Earle) about two-thirds of wine to one-third of water; if the parts appeared insensible, and no pain at all was produced by the first quantity thrown in, I have withdrawn the syringe, and added to the proportion of wine; on the contrary, if the complaint was recent, and the parts irritable, I have increased the proportion of water, so that I have hitherto been principally guided by the degree of sensation, which the patient has expressed. I have lately used pure water mixed with wine, and found it answer as well as when astringents were added." (*P.* 103, *Treatise on the Hydrocele, Ed.* 2.) In the preface, the author says, that he has long disused the pipe with a stop-cock, which he once employed, on account of not being well able to spare a hand, during the operation, to turn it, and its consequently being found awkward. A pipe, one end of which is made to fit into the cannula of a trocar, the other adapted to receive the neck of an elastic bottle, with a valve, or ball, in the centre of the pipe to permit the entrance, and prevent the exit, of the injection, will be found infinitely more convenient and useful. (*Earle.*) When the hydrocele is very large, Sir James recommends simply letting out the fluid, and waiting till the tumour acquires a more moderate size before attempting the radical cure by injection.

It appears from Sir James Earle's interesting cases, that a cure may be accomplished in this manner, even when the tunica vaginalis is considerably thickened. The following is the common mode of operating; the hydrocele is to be tapped with a trocar at its anterior and inferior part, and, when the whole of the fluid is evacuated, the cavity of the tunica vaginalis is to be distended to its former dimensions with the above injection. This is to be allowed to remain in the part about five minutes, upon the average, after which it is to be discharged through the cannula. The patient usually feels some pain in the groin, and about the kidneys, on the injection being introduced: which symptoms are rather desirable, as they evince that the stimulus of the fluid is likely to have the wished-for effect of exciting the necessary degree of inflammation. This plan, which was brought to a high pitch of perfection by the late Sir James Earle, may be deemed almost an infallible means of obtaining a permanent cure; and being, at the same time, mild, is mostly preferred in England, France, and Germany.

The treatment after the operation is exactly like that of the common swelled testicle, (see *Hernia Humoralis,*) consisting of the use of fomentations, poultices, leeches, saline purges, and, above all, of a bag truss for keeping up the scrotum.

There is a particular case, that has been called the *congenital hydrocele,* by which is implied a collection of water in the tunica vaginalis, with a communication between the cavity of this membrane and that of the peritonæum. Desault used to cure this disease, by a red wine injection. After the protruded viscera had been returned into the belly, and while the opening between that and the inside of the tunica vaginalis was carefully compressed and closed by a trusty assistant, Desault, after letting out the water in the common way, used to throw in the injection. The method, it is said, succeeded without causing the perilous consequence, one might *à priori* expect, viz. inflammation of the peritonæum.

This kind of hydrocele has not been described by many writers. The case is easily distinguished by the fluid being capable of being pushed into the belly. According to Desault, this disease admits of a cure by injections, care being first taken to press the upper part of the cord, so as to keep the injection from coming into contact with the peritonæum. A successful instance of this practice is related, by which a boy was cured both of a congenital hydrocele and hernia. The patient was nine years old, and had in his scrotum, ever since he was born, a fluctuating semi-transparent tumour, which was free from pain, of the size of a large egg, and disappeared when compressed, and in a horizontal posture. (See *Œuvres Chir. de Desault, T.* 2, *p.* 442.)

This subject of congenital hydrocele has been more particularly considered in my other work.

One caution it is necessary to offer, before taking our leave of this subject; it has sometimes happened, during the operation, that the cannula has slipped out of the tunica vaginalis, and its inner mouth become situated in the substance of the scrotum, in which event the operator, if he persists in propelling in the injection, will fill the cellular texture of the part with a stimulating fluid, which may cause sloughing, and other unpleasant symptoms, without entering the cavity of the tunica vaginalis, or producing a radical cure of the hydrocele, which, however, I have known happen from this cause, as I have elsewhere related. (See *First Lines of Surgery, Vol.* 2.) When such an accident happens, it is better to defer the operation, till a sufficient quantity of fluid has collected again. Hydroceles have been cured by applying to the scrotum a solution of muriate of ammonia in vinegar and water. (*Keate.*) But, the application frequently creates a good deal of pain and irritation, and does not often succeed, to say the best of it. (*Earle.*)

Distending the tunica vaginalis with air, cold water, or even the fluid discharged, has sometimes effected a radical cure. (See *Supplement to Ploucquet, Tub.* 1814, *p.* 103.)

For many other important remarks, concerning hydroceles, I am obliged to refer to the 2d vol. of the last edition of the *First Lines of the Practice of Surgery,* 1820. *Monro on the Tumours of the Scrotum in the Edinb. Med. Essays, Vol.* 5. *John Douglas, A. Treatise on Hydrocele,* 8vo. *Lond.* 1755; *and Answer to Remarks on that Work,* 8vo. *Lond.* 1758. *Pott on the Hydrocele; Else on the on the Hydrocele,* 8vo. *Lond.* 1776; *and the Works of Joseph Else,* 8vo. *Lond.* 1782. *W. Dease, on the Different kinds of Hydrocele,* 8vo. *London,* 1798. *Keate; B. Bell, on Hy-*

drocele, Sarcocele, &c. 8vo. Edinb. 1794. *Sir James Earle, Treatise on the Hydrocele, 2d Ed. 8vo. Lond.* 1803. *Schreger Chirurgisches Versuche, B.* 1, *8vo. Numberg,* 1811; *a cure effected by the injection of air, p.* 306. *Bertrandi, in Mém. de l'Acad. de Chir. T.* 3; *and in Trattato delle Operazioni di Chirurgia, Nizza,* 1763. *Desault, Remarques, &c. sur diverses espèces d'Hydrocele. Œuvres. Chir. T.* 2. *S. Sharp's Treatise on the Operations, and his Critical Inquiry. J. Howard, Obs. on the Method of Curing the Hydrocele by Means of a Seton, 8vo. Lond.* 1783. *Sabatier, Médecine Opératoire, T.* 1, *Ed.* 2. *Scarpa, Traité des Hernies, p.* 64, *&c. Larrey, Mémoires de Chir. Militaire, T.* 3, *p.* 409, *&c. T. Ramsden, Practical Observations on the Sclerocele, &c. 8vo. Lond.* 1811. *W. Wadd, Cases of Diseased Bladder and Testicle, 4to. Lond.* 1815. *Kinder Wood. some Observations on the Cure of the Hydrocele of the Tunica Vaginalis, without procuring an Obliteration of the Sac, in Med. Chir. Trans. Vol.* 9. *p.* 38, *8vo. Lond.* 1818.

*HYDROPHOBIA. (from ὕδωρ, water, and φόβος, fear. *A dread of water.*) This being, for the most part, a striking symptom of the fatal indisposition which results from the bite of a mad dog, and some other animals affected in the same way, the disease itself has been named *Hydrophobia.* Some have used the more general term, *hygrophobia,* from ὑγρὸν, liquid. But strong objection has been made to both these terms, because derived from a symptom, which does not exclusively belong to the disease, nor constantly exist in it.

The old writers, as we learn from Cælius Aurelianus, used the terms *aërophobia,* or *a dread of air,* and *pantephobia,* or *a fear of all things.* Since the impression of cold air sometimes excites terror, and the disorder is marked by a singular degree of general timidity and distrust. Others called it *phobodipson* (δίψος, signifying thirst,) because the patient is *thirsty,* yet *fears* to drink. Several modern authors, however, objecting to any appellation expressive only of one symptom, denominate the disease *rabies,* and *rabies canina,* or canine madness. The French call it *la rage.*

With respect to hydrophobia, or the dreadful indisposition produced by the bite of a dog, or other animal, affected with rabies, or by the application of some of the secretions of such animal to a part of the body, the first allusion to it to be found in authors, is that made by Aristotle, (*Hist. Animal. lib.* 7, *cap.* 22;) but he could have had but very erroneous notions upon the subject, since he sets down man as incapable of receiving the distemper from the bite of a rabid dog.

With respect to a name for the disorder, as the patient does not commonly betray any tendency to fury, while the dread of water is really a customary attendant on the complaint, the terms *rabies* and *la rage* seem strictly even more exceptionable than the word hydrophobia. At the same time, in order not to imbibe confused notions, whatever name be thought fittest for the illness arising in the human subject from the bite of a mad dog, and some other animals similarly affected, it is necessary to understand well, that hydrophobia, *in the sense of a horror of water, or other liquids,* is an occasional symptom of many diseases, and neither exclusively confined to the indisposition caused by the bite of a rabid dog, or certain other animals, nor even constantly attendant upon it. And, with the same view of avoiding perplexity, all hydrophobic complaints may be arranged in two general divisions:

1. The first, comprising all cases not ascribable to the bite of a rabid animal, or the application of some of its secretions to a part of the body.

2. The second, comprehending the examples preceded by one of those occurrences.

The cases included in the first of these divisions are subdivided into the *symptomatic* and *idiopathic,* or *spontaneous.* By *symptomatic hydrophobia* is understood an aversion or dread of liquids, presenting itself as an occasional symptom of various diseases, as of certain inflammatory, febrile, and nervous disorders, hysteria, epilepsy, injuries of the brain, (Trecourt, in *Recueil Périodique, &c. T.* 6; *Acta Naturæ Curios. Vol.* 2, *Obs.* 205,) the operation of particular poisons; (*Villermay, Traité des Mal. Nerreuses, T.* 1, *p.* 90; *Harles über die Hundiswuth, Frankf.* 1809; *Schmiedel, Diss. de Hydrophobia ex usu fructuum fagi, Erlang.* 1762, &c.) gastritis, pneumonia, hepatitis, angina, &c. &c. In many of the instances of symptomatic hydrophobia, the aversion, or dread of fluids, occurs on the same day as the cause upon which it depends, or a few days afterward; and, for the most part, may be cured with the disease which has given rise to it, or even independently of it. On the contrary, the hydrophobia from the bite, or infection of a rabid animal, does not come on till a long time after the occurrence of the cause, and, when once formed, has hitherto proved incurable, or very nearly so. Whatever analogy, therefore, may be imagined to exist between symptomatic hydrophobia and rabies, they differ essentially in their causes, progress, degree of curability, and also in the treatment required. (See *Dict. des Sciences Med. T.* 4, *p.* 38.)

Spontaneous, or *idiopathic* hydrophobia, denotes the questionable form of the complaint, sometimes supposed to be induced by violent mental commotion, anger, fright, &c. unpreceded by any other primary disease, to which it can be referred as a symptom.

Numerous facts upon record leave no doubt concerning the reality of symptomatic hydrophobia; but, perhaps, none of the cases adduced by Raymond (*Mém. de la Soc. Royale de Méd. T.* 2, *p.* 457,) Roupe (*Nova Acta Physico-Méd. T.* 4,) or Pouteau (*Essai sur la Rage, Lyons,* 1763,) in proof of the possibility of a spontaneous idiopathic form of the disease in the human subject, are sufficiently unequivocal to remove all suspicion, that the complaint either had been preceded by another primary disease (*Dict. des Sciences Méd. T.* 22, *p.* 333,) or had been the result of an unobserved, or forgotten occasion, on which the infection was received from handling a dog, or cat, never suspected at the time to be affected with rabies. Here a wrong conclusion is the more apt to be drawn, in consequence of the disease being communicable without any bite to fix the patient's attention, and not commencing sometimes for months after the unnoticed receipt of the infection. Thus, Francis Stannier died, in Nov 1787, with symptoms of hydrophobia, though it was not known that he had ever been bitten by a mad dog, (*Lond Med. Journ. Vol.* 9, *p.* 256;) yet, what safe inference can be drawn from this case, when the above-mentioned circumstances are recollected, and it is known that the man was often drunk, and in the streets at night? These and other considerations even throw a doubt upon a part of the cases, recorded as instances of symptomatic tetanus, and they lead the generality of the modern writers to incline to the sentiment of Dr. J. Hunter, that a disease, similar in its nature to what is produced by the bite of a mad dog, never arises *spontaneously* in the human subject. (See *Trans. of a Soc. for the improvement of Med. and Chir. Knowledge, Vol.* 1, *p.* 299—303.) Many of the symptomatic cases, however, or those in which more or less aversion, or dread of liquids, is evinced as an effect of another disease, are too well authenticated to admit of doubt. In the *Dict. des Sciences Méd. T.* 22, *art. Hydrophobie*, may be found a great deal of information likely to interest such readers as wish to follow up the subject of the symptomatic forms of the disease. However, in looking over some of the cases there detailed, a suspicion will sometimes arise in an intelligent mind, that the disorder was mistaken; for it will be noticed, that sometimes pain shooting up the limbs preceded the general indisposition, while the rapidity of the disease, and the appearances found on dissection, corresponded precisely to what is usually remarked in hydrophobia. In particular, one patient is described as a man habituated to drinking, and, as a *sportsman, to dogs also*; he died on the third day, and, on dissection, the stomach and intestines were found inflamed, and even gangrenous in several places, the œsophagus and lungs also participating in the inflammation. (*Commerc. Litter. Noremb.* 1743, *Hebd.* 5.)

Animals of the dog kind, including the wolf and the fox, are most frequently the subject of rabies; and certain writers have maintained, that, although it may be received and propagated by other animals, yet it always originates in some of the canine race. (*Hillary on Diseases of Barbadoes, p.* 246.) However, it is asserted, that the disease sometimes originates spontaneously in cats, that is to say, without their having been previously bitten by another rabid animal; but the moderns do not incline to the belief, that it ever has been known to commence in this manner in other animals, though such an assertion is made by Cœlius Aurelianus, Porphyrius, Avicenna, Valeriola, Stalpart-vander Wiel, &c. not only with respect to man, but horses, asses, camels, hogs, bullocks, bears, monkeys, and even poultry. (See *Dict. des Sciences Méd. T.* 47, *p.* 45.)

It is interesting to inquire, what animals are capable of communicating rabies, and what animals of receiving it? As far as our knowledge yet extends, it appears that animals of the canine species, with perhaps those of the feline race, are the only ones in which this disorder ever arises spontaneously, and they may transmit it to animals of their own kind, to other quadrupeds, and to man. The experiments made by Dr. Zincke, tend to prove also that birds, at least the common fowl, may have the disease communicated to them. (*Neue Ansichten der Hundswuth, &c. 8vo, Jena,* 1804.)

But, though it be well known, that animals of the dog and cat kinds can propagate the disorder, it is not settled whether it can be communicated by other animals. In a memoir read to the French Institute, M. Huzard explained that herbivorous quadrupeds, affected with rabies, are incapable of transmitting the disease; a position subsequently confirmed by additional experiments and observations made in the veterinary school at Alfort. Professor Dupuy could never communicate the distemper to cows and sheep, by rubbing their wounds with a sponge, which animals of the same class, already labouring under the disease, had had in their mouths; though the same experiment, made with a sponge, which had been bitten by a rabid dog, propagated rabies by a kind of inoculation. Dupuy has likewise seen, among several flocks, sheep affected with rabies, yet the distemper was never communicated by them to other sheep, notwithstanding the latter were bit in parts stripped of wool. Dr. Gillman inoculated two rabbits with the saliva of a rabid pig; but the disease was not communicated to them. (*On the Bite of a Rabid Animal, p.* 38.) On the other hand, Mr. King, of Clifton, is stated to have communicated rabies to a fowl, by inoculating it with the saliva of an ox, which had just fallen a victim to the disease. (*J. Ashburner, Diss. de Hydrophobia, p.* 29.) The author of the article *Rage* (*Dict. des Sciences Méd.*) observes, respecting this singular case, that, as it is accompanied with no details, doubts must remain, whether the fowl actually died of rabies.

As for some extraordinary cases, in which the disease is alleged to have been communicated to the human subject by the bites of birds, or injuries done with the claws of animals, they are generally dismissed by modern writers, with the inference, that the complaint thus transmitted was not true hydrophobia or rabies. This conclusion is made, with respect to the cases of this kind, reported by Cœlius Aurelianus and Bader, and the notorious example mentioned by A. Baccius of a gardener, who died of the bite of a cock, which, according to some, was rabid, according to others, merely enraged. Hildanus also details an instance, in which a young man was scratched on the great toe by a cat: and, some months afterward, was attacked with hydrophobia (*Obs. Chir. Cent.* 1, *Obs.* 16;) but, as a modern writer observes, if the patient were really affected with rabies, it is conceivable that the cat's claw, with which the scratch was made, might have been wet with the animal's saliva. (*Dict. des Sciences Méd. T.* 47, *p.* 47.)

Another question of considerable importance is, whether hydrophobia, that is to say rabies, can be communicated from one human being to another?—or whether, in man, the disease is infectious or contagious? Many attempts have been made, in vain, to communicate the distemper to several kinds of animals, by inoculating them with the saliva of patients who had perished of the disease. These experiments were made in this country by Gauthier, Vaughan, Babington, &c.; but no infection was the consequence. In France, Giraud inoculated several dogs with the saliva of a man in the convulsed stage of hydrophobia, but none of them afterward took the distemper. (*Bosquillon, Mém. sur les Causes de l' Hydrophobie, in Mém. de la Soc. d'Emulation, 5me année.*) M. Girard, of Lyons, collected some of the frothy saliva the instant it was discharged from a patient's mouth, and he inserted some of it into eight punctures, made on the inside of a dog's four legs; yet, six months after this inoculation, the animal had not suffered the slightest inconvenience. (*Essai sur le Tetanos Rabiens, p.* 29.) A similar experiment was made on three dogs by M. Paroisse, who kept the animals between three and four months afterward, during all which time they continued quite unaffected. (*Bibl. Méd. T.* 43.)

Dr. Bezard published the following experiments:—Pieces of the flesh of a person who had died of hydrophobia, were smeared with his saliva, and given to a dog; another dog was suffered to eat the salivary glands; and a third, the sides of a wound. In three other dogs, incisions were made, the cut parts were then inoculated, and sewed up. Not one of these six animals became affected with rabies. (See *Mém. et Obs. lus à la Soc. Méd. Philanthropique, première année,* 1807, *p.* 17.)

The preceding experiments only furnish negative results: but one, to which we shall now advert, tends to establish a contrary opinion. On the 19th June, 1813, in the Hotel-Dieu, at Paris, Magendie and Breschet took some of the saliva of a man, who died a few minutes afterward of hydrophobia, and, by means of a bit of rag, they conveyed this saliva to the short distance of twenty paces from the patient's bed, and inoculated with it two healthy dogs. One of the dogs became rabid on the 27th of July, and bit two others, one of which was attacked with complete rabies on the 26th of August. (*C. Busnout; see Collect. des Thèses, in 4to. de la Faculté de Paris,* 1814.) It is remarked, in the work, from which I have collected these particulars, that the foregoing is one of the best authenticated experiments on the subject; for, in addition to the consideration of the talents and characters of the experimenters themselves, the facts were witnessed by numerous medical students. And, notwithstanding the objections which have been urged against the account, (see *Journ. Gen. de Méd. T.* 52, *p.* 15) the main points are declared to be entitled to credit. (See *Dict. des Sciences Méd. T.* 47, *p.* 48.

With these relations, it is proper to notice certain cases, too credulously promulgated as proofs of the possibility of the disease being communicated from one human being to another. Neither the instance of the maid-servant, who died merely from seeing her mistress vomit, while labouring under hydrophobia (*Mich. Ettmuller, Op. Med. T.* 2;) the case of the peasant's children, *which all died on the seventh day,* as is alleged from embracing their dying father; the example of a woman contracting hydrophobia from her husband, as detailed by Mangor (*Acta Soc. Reg. Hafniens. V.* 2, *Obs.* 32, *p.* 408;) nor other cases of a similar tenor; are now regarded as proving any thing more than that the patients, supposed to have caught the disease by contagion, fell victims either to violent affections of the mind and nervous system, or illnesses accidentally taking place soon after the death of a near relation or mistress. It is clear enough also, that some of the cases were, at most, only instances of symptomatic hydrophobia.

With regard to another opinion, that the bite of a man, or other animal, when merely enraged, may bring on hydrophobia, it is now entirely discarded as erroneous. The cases in support of it, recorded by Cl. Pouteau, Mangetus, Malpighi, Zuinger, Le Cat, &c. when critically examined, only prove that the patients were affected with tetanus, or symptomatic hydrophobia, not arising from any infection; for neither the mode of attack, nor the progress of the symptoms, in any of the examples which are related with sufficient minuteness, lead to the inference, that the patients actually died of rabies. (See *Dict. des Sciences, Méd. T.* 47, *p.* 49.)

Wrong notions of a very dangerous tendency, have been generally entertained, in regard to the disease, as it appears in the canine race. The writer of the article *Dog,* in Dr. Rees's Cyclopædia, appears to have had extensive opportunities of observing the disorder in dogs, having paid attention to more than two hundred cases. From his remarks, I have collected the following information.

The peculiar symptom which characterizes the complaint in the human subject, has been applied to the disease in the dog, and has occasioned it to be called by the same name, hydrophobia. This is a palpable misnomer; for, in no instance, does there ever exist any dread of water; on the contrary, dogs are in general very greedy after it.

Such unfounded supposition has often conduced to a very fatal error: for, it being the received opinion, that no dog is mad who can lap water, many persons have been lulled into a dangerous security. Another equally false and fatal idea has prevailed, that every mad dog must be wild and furious; but this is so far from being true, that, in the greater number of instances, there is very little of that wild savage fury that is expected by the generality of persons. "Hence," says this author, "as it is evident that the term hydrophobia, characterizing the affection in the dog, is a misnomer, so it is evident that the term madness is equally so. In no instance have I ever observed a total alienation of the mind; in very few have the mental faculties been disturbed. The disposition to do mischief is rather an increased irritability than absence of sense; for, in most instances, even those that are furious, they acknowledge the master's voice, and are obedient." The symptom, which is most frequently first observable in a rabid dog, is a certain peculiarity in his manner; some strange departure from his usual habits. In a very great number of instances, the peculiarity consists in a disposition to pick up straws, bits of paper, rags, threads, or the smallest objects, which may happen to be on the floor. This is said to be particularly common in small dogs. "Others again show an early peculiarity by licking the parts of another dog. In one instance, the approach of the disease was foretold by our observing a very uncommon attachment in a pug-puppy towards a kitten, which he was constantly licking; and likewise the cold nose of a healthy pug that was with him. An attachment to the sensation of cold appears in many cases, it being very common to observe them (the dogs) licking the cold iron, cold stones, &c. Some dogs, early in the disease, will eat their own excrement, and lap their own urine. An early antipathy to strange dogs and cats is very commonly observed, but particularly to cats. As the disease advances, the affected dogs bite those with which they are domesticated, and, lastly, the persons around; but, except in a moment of irritability, they seldom attack the human subject. The irritability that induces them to bite is very strong, but is devoid of wildness. It is more like peevishness than fury. A stick held up at them always excites their anger in a violent degree, and throughout the disease there is generally a wonderful impatience of control, and the animals are with great difficulty frightened. (See *art. Dog, in Rees's Cyclopædia.*)

To this passage the following remarks may be added:—Dr. John Hunter calculated, that out of every dozen of rabid dogs, about one evinces no particular tendency to bite. That these animals, and wolves also, have no particular dread of fluid, is proved by facts. Thus, a rabid wolf, at Frejus, swam across several rivers. (*Darluc, Recueil Périod. d'Obs. Vol.* 4.) Duboueix has seen mad dogs drink without difficulty, and plentifully. (*Hist. de la Soc. de Méd. an.* 1783.) Rabid animals will sometimes eat as well as drink. Thus the wolf which bit so many persons at Meyne, in 1718, was found in the morning devouring a shepherd's dog. And Dr. Gilman speaks of a dog, which was not deemed rabid, because it eat and drank well; but, as it seemed indisposed, it was killed, though not before it had bit a man, who fell a victim to hydrophobia. (*On the Bite of a Rabid Animal, p.* 15.)

When a dog bites a person, it should not be immediately killed, but merely chained up, because, by destroying it at once, the possibility of ascertaining whether it was rabid is prevented, and great alarm is thus kept up in the mind of the wounded person and his friends. If the animal be affected with rabies, it will perish in a few days. At the veterinary school at Alfort, when a dog has been bit, it is usual to chain the animal up, for at least fifty days, before it is restored to its master, about six weeks being considered the period when a dog generally becomes rabid after being bitten.

For additional details, relating to the disease as it appears in the dog, I must refer to the above-mentioned paper. Enough, I hope, has been said to make the reader aware, that mad dogs are not particularly characterized by an inability to lap water, or any degree of fury. These animals, when actually affected with rabies, from their quiet manner, have even not been suspected of having the disorder, and have been allowed to run about, been fondled, and even slept with. (See *Mem of Swedish Acad.* 1777.)

The causes of this peculiar distemper in dogs are at present unknown, and little more than conjecture prevails upon the subject. It is not positively known whether rabies sometimes originate spontaneously in these animals, though I believe this opinion is at present gaining ground; or whether, like small-pox in the human species, it is propagated only by contagion. That the disease is frequently imparted in consequence of one dog biting another, every body well knows. Yet there are many instances in which this mode of propagation cannot be suspected. Several facts render it probable, that, among dogs, the disease is often communicated by contagion. It is observed, that, in insular situations, dogs are seldom affected, and this circumstance is ascribed to such animals being in a kind of quarantine. The celebrated sportsman, Mr. Meynell, secured his dogs from the malady by making every new hound perform a quarantine before he was suffered to join the pack. (See *Trans. for the Improvement of Med. and Chir. Knowledge, Vol.* 1, *art.* 17.) Great heat was very commonly supposed to be an exciting cause of the disease in dogs; but without much foundation. "A very hot climate, or one exposed to the extremes of heat and cold; a very hot and dry season; feeding upon putrid, stinking, and magotty flesh; want of water; worms in the kidneys, intestines, brain, or cavities of the nose," are set down by Boerhaave as causes of the disease. (*Aphorism*, 1134.) We learn from Dr. J. Hunter, that, in the hot island of Jamaica, where dogs are exceedingly numerous, not one was known to go mad during forty years. (*Trans. for the Improvement of Med. Knowledge, loc. cit.*) Cold weather has also been set down as conducive to rabies among the canine race, as is suggested, because the ponds being frozen, these animals cannot quench their thirst. (*Le Roux.*) That neither of these sentiments about heat and cold being the cause of the origin of the disease in dogs is correct, will be manifest enough to any body who has patience to look over the volume of the *Mém. de la Soc. Royale de Méd.* devoted entirely to the consideration of rabies; and, from the investigations of M. Andry, (*Recherches sur la Rage, 8vo. Paris*, 1780,) it appears that January, the coldest month in the year, and August, the hottest, are those which furnish the fewest instances of hydrophobia. On the contrary, the greatest number of rabid wolves is in March and April; and that of dogs, affected with spontaneous rabies, in May and September.

According to Savary, dogs never go mad in the Island of Cyprus, nor in that part of Syria which is near the sea; and Volney assures us that these animals enjoy the same fortunate exemption both in the latter country and in Egypt. (*Voyage in Syrie, T.* 1.) The traveller Brown also declares, that, in Egypt, they are never, or very rarely, attacked with rabies.

"Although (says Baron Larrey) hydrophobia is more frequent in warm than temperate climates, it is not observed in Egypt, and the natives assured us, that they knew of no instance in which this disease had manifested itself, either in man or animals. No doubt this is owing to the species and character of the dogs of this country, and their manner of living.

"It is remarked, that the Egyptian dogs are almost continually in a state of inaction; during the day, they lie down in the shade, near vessels full of fresh water prepared by the natives. They only run about in the night time; they evince the signs and effects of their love but once a year, and only for a few instants. They are seldom seen coupled. On our arrival, there was a vast number of these animals in Egypt, because they were held, like many others, in great veneration, and were never put to death. They do not go into the houses; in the day time they remain at the sides of the streets, and they only wander into the country at night, in order to find any dead animals which happen to be unburied. Their disposition is meek and peaceable, and they rarely fight with each other. Possibly all these causes may exempt them from rabies." (*Larrey in Mém. de Chir. Militaire, T.* 2, *p.* 226.)

This observation, about the exemption of the Egyptian dogs from rabies, is a very ancient one, having been made by Prosper Alpinus, (*Rer. Ægyptiarum, lib.* 4, *cap.* 8.) According to Barrow, the dogs in the vicinity of the Cape of Good Hope, and in Caffraria, very rarely go mad. (*Travels into the Interior of Africa.*) Several authors assert, that rabies never occurs in South America. (*Bibl. Raisonnée*, 1750. *Van Swieten Comment. in Aphor.* 1129, *Portal, &c.*) L. Valentin declares, that it is exceedingly rare in the warm regions of America, but common in the northern part of that continent. (*Journ. Gén. de Méd. T.* 20.) Dr. Thomas, who resided a good while in the West Indies, never saw nor heard of a case of rabies there, (*Practice of Physic;*) and Dr. B. Moseley states that the disorder was not known in those islands, down to 1783. On the other hand, the disease sometimes happens in the East Indies, though not with such frequency as at all to justify the doctrine about heat being the cause of its production. The silence of Hippocrates proves, that in his days hydrophobia must have been very rare in Greece; and, as the disorder is not mentioned in the Scriptures, an inference may be made, that it could not be so common in the hot tracts of the globe, inhabited by the Hebrews, as in the temperate climates of Europe and America.

Neither can the sentiment be received as correct, that rabies is more frequent in the north than in the temperate parts of Europe; for De la Fontaine particularly notices how extremely rare it is in Poland. (*Chir. Med. Abhandl. Breslau*, 1792.) The disease is reported to be very common in Prussian Lithuania; but mad dogs are seldom or never heard of at Archangel, Tobolsk, or in the country north of St. Petersburg.

In Mr. Meynell's account, which was communicated to him by a physician, it is asserted, that the complaint never arises from hot weather, nor putrid provisions, nor from any cause except the bite; for, however dogs have been confined, however fed, or whatever may have been the heat of the season, the disorder never commenced, without a possibility of tracing it to the preceding cause, nor was it ever introduced into the kennel, except by the bite of a mad dog. (See *art. Dog, in Rees's Cyclopædia.*)

Dr. Gillman endeavours to prove, that the disease in dogs is probably excited independently of particular climates, of putrid aliment, of deficiency of water, of want of perspiration, or, of the worm under the tongue, to which causes it has been at different times ascribed, and he expresses his belief, that it originates somewhat like typhus in the human subject, and is not always produced by inoculation, or by means of a bite. He thinks that it may be occasionally brought on by the confinement of dogs, without exercise, in close and filthy kennels; and that the success of Mr. Trevalyan, as related by Dr. Bardsley, in clearing his kennel of the disease, by changing even the pavement, after other means of purification had failed, affords presumptive evidence in favour of the opinion; and, consequently, this author thinks, that the method of quarantine, adopted by Mr. Meynell, and recommended by Dr. Bardsley, on the supposition, that the disease originates exclusively from contagion, will not be a sufficient preventive alone; and he infers, from some facts, reported by Mr. Daniel, that the poison sometimes lies dormant in dogs four, five, and six months; and, consequently, that the period of two months is not a sufficient quarantine. (See *Gillman's Diss. on the Bite of a Rabid Animal.*)

In opposition, however, to some of the sentiments contained in the foregoing passage, it should be known, that Dupuytren, Magendie, and Breschet, have purposely kept many dogs for a long time in the most disgusting state of uncleanliness, let them even die in this condition for want of food and water, or even devour each other, yet without exciting rabies. (*Dict. des Sciences Méd. T.* 47, *p.* 53.) Yet Professor Rossi, of Turin, is said to have produced this, or some similar disease in cats, by keeping them shut up in a room. (*Mém. de l'Acad. Imp. de Turin*, 1805, *à* 1808, *p.* 93, *de la Notice des Travaux.*) On the whole, I consider it well proved, that neither long thirst, hunger, eating putrid flesh, nor filth, will occasion the disease in the canine race. At Aleppo, where these animals perish in great numbers from want of food and water, and the heat of the climate, the distemper is said to be unknown. Nor is rabies found to attack dogs and cats, with particular frequency during the copulating season, and therefore, the œstrus veneris cannot be admitted to have any share in its production, as some writers have been disposed to believe. (See *Dict. des Sciences Méd. T.* 47, *p.* 55.)

Although most writers believe in the reality of a poison, or specific infectious principle, in cases of rabies, the fact has been questioned, or absolutely rejected by others. Bosquillon considered the disease always as the effect of fear, or an impression upon the imagination. This view of the matter is far from being new, and has been ably refuted by many authors, and especially by M. De Sault, of Bordeaux, who remarks, that horses, asses, and mules, *quibus non est intellectus,* had died rabid the very year in which he wrote; and, it is observed by Dr. J. Vaughan, that an infant in the cradle is sometimes attacked, while many timorous children escape.

Another notion has partially prevailed, that rabies does not depend upon any virus, but upon the continuance of an irritation in the bitten parts, affecting the whole nervous system. (*Percival; J. Mease; Girard; &c.*) But, this doctrine confounds rabies and tetanus together, and can only apply to the symptomatic non-infectious hydrophobia from an ordinary wound, or laceration.

The facts, in proof of the reality of a peculiar infectious principle in cases of rabies, are too numerous to leave any doubt upon the subject. Twenty-three individuals were bit one morning by a female wolf, of whom thirteen died in the course of a few months, besides several cows, which had been injured by the same animal. How could all these unfortunate persons have had similar symptoms, and especially a horror of fluids, had they not been all under the influence of some cause, besides the bites? The patients who died, were bit on the naked skin; while in the others, who escaped infection, the bites happened through their clothes, which no doubt intercepted the saliva, the vehicle of the virus. In the Essay by Le Roux, mention is made of three persons, bit by a rabid wolf near Autun, in July, 1781, and, notwithstanding mercurial frictions, they all died of hydrophobia. Of ten other individuals bit by a wolf, nine died rabid. (*Rey, Mém. de la Soc. Royale de Méd. p.* 147.) Twenty-four persons were injured in the same manner near Rochelle, and eighteen of them perished. (*Andry, Récherches sur la Rage, Ed.* 3, *p.* 196.) On the 27th January, 1780, fifteen individuals were bit by a mad dog, and attended at Senlis by the commissioners of the French Royal Society of Physic; ten had received the bites on the naked flesh, and five through their clothes. Of the first ten, only five lost their lives, three of them dying of decided rabies between the 27th of February, and the 3d of April; and the other two between the 29th of February, and the 18th of March. Unless the opinion be adopted, that the disease is caused by an infectious principle, a sort of inoculation, it would be impossible rationally to explain the cause of so many deaths from the bites of rabid animals. If the idea, that rabies originates from fear or nervous irritation were true, how could we account for there being such a difference between the usual consequences of the bite of a healthy dog, and those of the bite of one affected with rabies? Healthy dogs are incessantly quarrelling, and biting each other in the streets, yet their wounds are not followed by rabies; and as a modern author remarks, if hydrophobia were referrible to nervous irritation derived from the wounded part, how does it happen, that among the thousands of wounded after a great battle, hydrophobia is not seen instead of tetanus. (*Dict. des Sciences Méd. T.* 47, *p.* 61.) But, if it were yet possible to entertain a doubt of an infectious principle in hydrophobia, this possibility would be removed by the reflection, that the disease may be communicated to healthy animals by inoculating them with the saliva of certain other rabid animals. In fact, as I have stated, the bites of such animals are in every point of view only an inoculation; and the same remark may be extended to the numerous instances on record, in which the disease arose in the human subject, as a consequence of a rabid dog, or cat, (not suspected to be in this state at the time) having been played with, fondled, or suffered to lick the naked skin, in which there was at the moment some slight scratch, entirely overlooked.

Many of the ancient writers not only believed in the hydrophobic virus, or infectious principle, but even in its diffusion through the blood, flesh, and secretions in general; and this hypothesis was professed by Boerhaave, Van Swieten, Sauvages, F. Hoffman, &c. but, in proportion as the humoral pathology lost ground, the foregoing idea was abandoned, and the opinion adopted, that the infection is confined to the saliva, and wounded part, in which it has been inserted.

The tales of some old authors would lead one to think, that hydrophobia may be communicated by eating the flesh of a rabid animal. (*Fernelius, De Obs. Rer. Caus. et Morb. Epidem. lib.* 2, *cap.* 14; *Schenckius; Mangetus, &c.*) But, respecting these accounts, it is remarked, that they are not entitled to much confidence; for, it is certain, that rabies never begins as is stated, with regard to some of the cases in question, a few hours after the application of its cause, and its early stage is never characterized by any fury, or disposition to bite. And, besides, how can such relations be reconciled with the practice of the ancients, who, according to Pliny, employed the liver of the mad dog or wolf, as a remedy? Palmarius also fed his patients for three days with the dried blood of the rabid animal. (*Mém. de la Soc. de Méd. p.* 136, *et le No.* 178.) The flesh of a bullock, which had been bit by a mad dog, and afterward died rabid, was sold to the inhabitants of Medola near Mantua, yet none of them were attacked with hydrophobia. (*Andry, Récherches sur la Rage, &c. p.* 30.) Dr. Le Camus informed Lorry, that he had eaten the flesh of animals which died rabid, but he suffered no inconvenience from the experiment. And, it is stated in the letter of Dr. L. Valentin, that the negroes in the United States of America had no illness from eating the flesh of pigs, which had died of rabies. (*Journ. Gén. de Méd. T.* 3, *p.* 417.) As for the question, whether the blood is infected? It is generally considered to be settled in the negative, notwithstanding the account given by Lémery of a dog, which was attacked with rabies, as is said, from lapping the blood of a hydrophobic patient, who had been bled. (*Hist. de l'Acad. Royale des Sciences,* 1707, *p.* 25.) Dupuytren, Breschet, and Magendie, were never able to communicate rabies by rubbing wounds with blood taken from mad dogs; and they even several times injected such blood into the veins of other healthy dogs, yet none of these latter animals were attacked with rabies, though they were kept for a sufficient length of time to leave no doubt upon the subject. (See *Dict. des Sciences Méd. T.* 47, *p.* 63.)

A point of greater practical interest than the former, is, whether the drinking of the milk of an animal, labouring under rabies, is attended with any risk of communicating the disease? It is asserted by Timæus, that a peasant, his wife, children, and several other persons, were seized with hydrophobia, in consequence of drinking the milk of a rabid cow; and that the husband and eldest child were saved by medical treatment; but, that the wife and four of the children died. It is further stated, that three or four months afterward, the maid and a neighbour, who had partaken of the milk of the same cow, also died of hydrophobia. (*Cons.* 7, *Obs.* 33.) In opposition to this account, however, several facts, reported by other writers of greater credit, tend to prove, that hydrophobia cannot be communicated by the milk of a rabid animal. (*Nova Acta Nat. Cur. Vol.* 1, *Obs.* 55; *Baudot, in Mém. de la Soc. Royale de Méd. an* 1782 *et* 83, *T.* 2, *p.* 91.)

The cases reported by F. Hoffman and Chabert, with the view of proving the possibility of infection, through the medium of the semen, are of no weight, because, on a critical examination of them, it will be found, that the infection of the women is stated to have taken place very soon after their husbands had been bit, which is quite at variance with the established character of the disease, as it never commences, and of course cannot be propagated in any manner, soon after the receipt of the bite. Besides, these histories are refuted by others of greater accuracy. (See *Baudot in Mem. de la Soc. Royale de Med. an* 1782, *&c., p.* 92; *Rivallier, Vol. cit. p.* 136; *p.* 211; *Bouteille, p.* 237; *Boissière, in Journ. Gén. de Méd. T.* 17, *p.* 296.)

Neither can hydrophobia be imparted by the breath, notwithstanding the statements of Cælius, Aurelianus, and some other old writers. A nurse, mentioned by Dr. J. Vaughan, repeatedly kissed a hydrophobic infant, which she had suckled, and exposed herself incessantly to its breath, but without the least ill effects. The fear which has also been entertained of the disorder being receivable from the application of the patient's perspiration to the skin, is not founded upon any authentic facts.

Does the infectious principle of rabies reside in the salivary secretion, or in the mucus of the trachea and bronchiæ? The common belief is, that in hydrophobia, the salivary glands are considerably affected. But, it has been remarked by a modern writer, that if these glands exhibit no morbid alteration during the whole course of the disorder; if they are found healthy after death; if the air-passages are the seat of inflammation; if the saliva does not constitute the frothy slaver about the lips; and if such slaver, wherewith the disease may be communicated by inoculation, is derived from the inflamed windpipe and bronchiæ, and consists of mucus converted into a kind of foam by the convulsive manner in which the patient breathes, there is some reason for questioning, whether the saliva, strictly so called, undergoes the alteration generally supposed? (See *Dict. des Sciences Méd. T.* 47, *p.* 66.) However, this writer is not exactly correct, when he describes the frothy secretion about the mouth, as being altogether composed of mucus from the trachea, since a great part of it is unquestionably true saliva and mucus secreted in the fauces and mouth. In the stomachs of dogs, which died rabid, Dr. Gillman constantly observed traces of inflammation, and he once tried to communicate the disease to two rabbits, by inoculating them with matter taken from pustules, found in the stomach of a rabid dog; but no infection took place. (*On the Bite of a Rabid Animal, p.* 32.)

According to Professor Rossi, of Turin, the nerves, "before they grew cold, participated with the saliva in the property of communicating rabies." He asserts, that he once imparted the disease by inserting in a wound a bit of the sciatic nerve, immediately after it had been taken from a living rabid cat. (See *Mém. de l'Acad. Imp. de Turin, Sciences, Phys. et Mathém. de* 1805 *à* 1808, *part.* 93. *de la Notice des Travaux.*)

After all which has been stated, concerning the hypothesis of the infectious principle of hydrophobia being more or less diffused through the solids and fluids of a rabid animal, and not being restricted to the saliva, perhaps, the safest conclusion to be made is, not to reject the opinion altogether, but to consider it as at present requiring further proof. And from observations of what happens in the human subject, the same inferences should not always be drawn, as from experiments on animals, which are liable to be attacked with spontaneous rabies of a decidedly infectious character. (See *Dict. des Sciences Méd. T.* 47, *p.* 67.)

Although many cases are to be met with in the records of medicine and surgery, tending to convey an idea, that the mere application of the saliva of a rabid animal to the sound entire skin of the human subject, may give rise to hydrophobia, the assertion is contrary to general experience, and liable to a reflection which must overturn the hypothesis; viz. the slightest prick, scratch, abrasion, or broken pimple on the surface of the body, such as would not be likely in many instances to excite notice, may render the application of the saliva to the part a positive inoculation.

Instances are also reported, the tenor of which is to prove, that the hydrophobic virus may take effect through a sound mucous membrane. (*Palmarius, de Morbis Contag.*; *Portal, Obs. sur la Rage, p.* 131; *Matthieu in Mém. de la Soc. Royale de Méd. p.* 310, *&c.*) But that this does not happen in the human subject is tolerably well proved by the consideration, that formerly a class of men made it their business to suck the wounds, caused by the bites of rabid animals; yet none of them contracted hydrophobia from this bold employment. (*Bosquillon, Mém. de la Soc. d'Emulation, T.* 5, *p.* 1.) The example of the nurse, who repeatedly kissed a child without the least ill effect, while it was dying of rabies, as recorded by Dr. J. Vaughan, has been already noticed. However, if hydrophobia were apparently to arise in any rare instance from the application of the slaver of a rabid animal to the inside of the lips, no positive inference could be drawn from the fact, unless the means were also possessed of ascertaining, that there were no slight abrasion about the gums, or within the mouth, previously to such application.

For the hydrophobic virus to take effect, therefore, it is generally, if not always necessary, that the infectious saliva be either applied to an abraded, wounded, or ulcerated surface. In the case of a bite, the teeth are the envenomed weapons, which at once cause the solution of continuity, and deposit the infection in the part. But the mere abrasion of the cuticle, and the application of the infectious saliva to the denuded cutis, will often suffice for the future production of the disease. As the mode of communication, therefore, is a true inoculation, it follows, that the danger must depend very much upon the quantity of infectious matter conveyed into, or applied to the part, the effectual manner, in which the saliva is lodged in the flesh, the extent and number of the wounds, and particularly the circumstance of the teeth of the rabid animal having passed through no clothes, by which the saliva might possibly be effectually prevented from entering the wound at all. Hence, bites on the hands and face are well known to be of the most dangerous description, especially those on the face, the hands being sometimes protected with gloves.

From what has been observed, however, it is not to be concluded, that the disease always follows, even when the animal, which inflicts the bite, is decidedly rabid, and some of its saliva is actually applied to the wounded or abraded parts. On the contrary, experience fully proves, that out of the great number of individuals often bit by the same mad dog, and to whom no effectual prophylactic measure is extended, only a greater or lesser number are afterward attacked with hydrophobia. When this difference in the fate of the individuals cannot be explained by the intervention of their clothes, the thickness of the cuticle at the injured part, the small size and superficial nature of the bite, the ablution of the part, or some other mode in which any actual inoculation may have been rendered ineffectual, it can only be referred to some unknown peculiarities, or differences in the constitutions of the several individuals. The latter conjecture seems more probable, when the fact is recollected, that some animals are more susceptible of rabies than others, and some appear to resist the infection altogether.

Dogs are more susceptible of the infection than the human species. Four men and twelve dogs were bit by the same mad dog, and every one of the dogs died of the disease, while all the four men escaped, though they used no other means of prevention but such as we see every day fail. There is also an instance of twenty persons being bit by the same mad dog, of whom only one had the disease.

Dr. Heysham has defined hydrophobia to be an aversion and horror at liquids, exciting a painful convulsion of the pharynx, and occurring at an indeterminate period after the canine virus has been received into the system. Dr. Cullen places it in the class *neuroses*, and order *spasmi*, and defines it a loathing and great dread of drinking any liquids, from their creating a painful convulsion of the pharynx, occasioned most commonly by the bite of a mad animal. Others have suggested the following definition, as more complete: melancholy, dread of cold air, of any thing shining, and particularly of water; often arising from the bite of a mad animal. (*Parr's Med. Dict.*) However, the latter definition is, perhaps, equally objectionable, because there is not invariably a dread of shining bodies. (See *Dr. Powell's Case, p.* 8.) While some authors represent it as a nervous disorder, others, among whom is Boerhaave, consider it as one of an inflammatory nature. In many systems of surgery, hydrophobia is treated of with poisoned wounds, of one species of which it is strictly the effect.

With regard to the symptoms of hydrophobia, they are generally tardy in making their appearance, a considerable, but a very variable space of time usually elapsing between their commencement and the receipt of the bite. Out of a table of 131 cases, none of the patients became ill before the eleventh day after the bite, and only three before the eighteenth. It is pretended by Pouteau, that one patient was bit by a dog in the morning, and was attacked with hydrophobia at three o'clock in the afternoon. But as this account was communicated to the author a long time after the occurrence, and not by a medical man, it deserves little confidence. Another case, adverted to by Mead, is deprived of all its importance by the same consideration. These examples, as well as another reported by Astruc, in which the patient is said to have had hydrophobia in less than three days after being wounded on the temples, can at most be regarded only as specimens of symptomatic hydrophobia. (*Dict. des Sciences Méd. T.* 47, *p.* 74.) There appears to be no determinate period, at which the disorder makes its attack after the bite; but it is calculated, that the symptoms most frequently commence between the 30th and 40th day, and that after this time the chances of escape increase. Of 15 patients, whose cases Trolliet was acquainted with, seven were attacked between the 14th and 30th days; five between the 30th and 40th; two a little beyond the latter period; and one after 14 weeks. In May, 1784, 17 persons were bit by a rabid wolf, near Brive, of whom 10 were afterward attacked with hydrophobia; viz. one on the 15th day after the bite; one on the 18th; one on the 19th; one on the 28th; one on the 30th; one on the 33d; one on the 35th; one on the 44th; one on the 52d; and the last on the 68th day. (*Hist. de la Soc. Royale de Méd. p.* 209.) Fothergill and Mosely mention cases, in which the disease began four months after the bite; and M. Matthey, of Geneva, details an instance, in which the interval was 117 days. (*Journ. Gén. T.* 54, *p.* 275.) Hagnenot knew of a case, in which the interval between the bite and the commencement of the illness was five months. (*Portal, p.* 183.) Dr. J. Vaughan mentions an interval of nine months; Mead, of 11; Galen, Bauhin, and Boissière, of a year; Nourse, of 19 months; and R. Lentilius, of three years.

Dr. Bardsley, of Manchester, has recorded a case, in which the most careful inquiries tended to prove, that the patient had never suffered the least injury from any animal, except the bite, inflicted twelve years previously to the commencement of hydrophobia, by a dog apparently mad. (*Mem. of Liter. and Phil Society of Manchester, Vol.* 4, *Part.* 2, *p.* 431.)

A merchant of Montpellier is also stated to have been attacked with hydrophobia ten years after the bite of a rabid dog, which also bit the patient's brother, who died hydrophobic on the 40th day after the accident. (See *Dict. des Sciences Méd. T.* 47, *p.* 75.) Here may also be found references to cases, in which the interval is alleged to have been 18, 20, and even 30 years. It is certainly difficult to attach any credit to these very late periods of attack. Dr. J. Hunter considers 17 months, and Dr. Hamilton 19, the longest interval deserving belief. (*On Hydrophobia, Vol.* 1, *p.* 113.) Exposure to the heat of the sun, violent emotions of the mind, and fear, are believed to have considerable influence in accelerating the commencement of the symptoms. That mental alarm is also of itself sometimes capable of bringing on a simple hydrophobia, totally unconnected with infection, is incontestable; a case, which has not always been duly discriminated. A most convincing proof of this fact is recorded by Barbantini, in the Italian Journ. of Physic, Chymistry, &c. for January and February, 1817. 'A young man was bit by a dog, which he fancied was mad, and on the 5th day he evinced symptoms of hydrophobia, of which he was nearly dying, when the dog which had bit him, was shown to him perfectly well, and the intelligence tranquillized him so effectually, that he was quite well four days afterward. Mr. John Hunter is said to have mentioned in his Lectures a very similar case, in which he believed the patient would certainly have died, if the dog which inflicted the bite had not been found, and shown to the patient perfectly well. (See *Journ. Gen. de Med. T.* 41, *p.* 215.) It is to the effects of terror, that several modern writers are disposed to refer the instances of very late attacks of hydrophobic symptoms after the period when the patients were bitten; though, unless the intellects be changed in the mean time by other causes, it is difficult to conceive, why the alarm should not have the greatest effect earlier, while the impression of the danger is undiminished by time. The idea, that the symptoms begin sooner after the bite of a wolf, than that of a dog, is not adopted by a writer who has taken great pains to collect information on the present interesting disorder.' (See *Dict. des Sciences Méd. T.* 47, *p.* 77.)

Cullen has divided the disease into two stages, the hydrophobia *simplex* and *rabiosa*; or the *melancholy* and *raving* stages of some other writers. But as the early stage is frequently unattended with any thing like melancholy, it is best merely to adopt the distinction of the *first* and *second* stages; one comprehending the effects of the disorder previously to the occurrence of a dread, or decided aversion of liquids; the other, the subsequent changes. The wound, if treated by common methods, usually heals up at first in a favourable manner. At some indefinite period, and occasionally, long after the bitten part seems quite well, a slight pain begins to be felt in it, or the neighbouring parts, now and then attended with itching, but generally resembling a rheumatic pain. If the bite took place on the finger, the pain successively extends from the hand to the fore arm, arm, and shoulder, without any redness or swelling in these parts, or any increase of suffering from pressure or motion of the limb. In a great number of instances the trapezius muscle, and the neck, on the same side as the bite, are the points to which the pain principally shoots. The cicatrix, in the mean while, begins to swell, inflames, and often festers and discharges an ichorous matter. These uneasy painful sensations recur from time to time, and usually precede any dread of water several days; and they are a just reason for apprehension. Sometimes pains of a more flying, convulsive kind, are felt in various parts of the body. As the disease advances, the patient complains of the pain shooting, from the situation of the bite, towards the region of the heart. Sometimes instead of pain, there is rather a feeling of heat, a kind of tingling, or even a sensation of cold, extending up to the chest and throat. Occasionally no local symptoms take place: thus Sabatier, in giving account of several cases, remarks it as worthy of notice, that the bitten parts did not become painful previously to the accession of the fatal symptoms; nor did any swelling, or festering occur. (See *Mém. de l'Institut. National, T.* 2, *p.* 249. *&c.*)

Dr. Marcet particularly observed, that the pain follows the course of the nerves, rather than that of the absorbents. In the case which he has related, as well as in one of the cases detailed by Dr. Babington, there was pain in the arm and shoulder, but without any affection of the axillary glands; and in another case, (See *Medical Communications, Vol.* 2,) the pain, occasioned by a bite in the leg, was referred to the hip and loins, without any affection of the inguinal absorbents. (*Medico-Chir. Trans. Vol.* 1, *p.* 156.) Of the accuracy of the foregoing statement, by Dr. Marcet, there is no doubt: the observation, however, in regard to the irritation not affecting the absorbents, was long ago anticipated by several authors, who urged the freedom of the lymphatic glands from disease, as an argument that the disorder did not depend upon the absorption of any virus. It is also noticed by others, who inclined to the belief, in the absorption of the infectious principle. "Resorptionem virus ope systematis lymphatici fieri verisimillimum videtur; neque tamen nec vasa lymphatica, nec glandulæ vicinæ stimulo morboso, vel tumore adfici videntur; quod in aliis resorptionibus virulentis fieri solet." (*Callisen Syst. Chirurgiæ Hodiernæ, Vol.* 1, *p.* 595, *Hafniæ,* 1798.)

Pain and heaviness are felt in the head. Sometimes, the headach is at first very severe: sometimes but slight; but, in the latter case, it often becomes intense, general, and accompanied with a sense of pressure upon the temples. In certain instances, the patient's sleep lasts a good while, though disturbed by dreams; while, in other more frequent examples, he is continually restless. The intellectual functions generally seem increased; the memory stronger; the conception more ready; the imagination more fertile; and the conversation more animated. However, some patients are silent and dejected, and, when questions are put to them, the answers are short and peevish. But the greater number are active, lively, and talkative. At the same time, the organs of sense betray signs of increased sensibility; and the eyes, which are very open and bright, avoid a strong light. Sometimes, the pupil is found to be considerably dilated. Extraordinary pains are felt about the neck, trunk, and limbs. It is not uncommon also for the patient to evince great anxiety, or to fall into a state of dull despair and melancholy. These last symptoms, of which great notice is taken by writers, are particularly ascribable to the effect of fear. The disorder of the organs of digestion is sometimes manifested in various ways, though it is far from being so frequent and striking, as the affections of the head, which precede it. The disorder referred to, consists at first in loss of appetite; nausea; vomiting; and afterward constipation, and sometimes colic. In the first stage of the disease, the pulse is generally somewhat more frequent and strong than in health, and the countenance appears more animated.

The above symptoms precede the second stage, or that of decided rabies, only by a few days, usually four or six, though sometimes but two or three. (*Dict. des Sciences Med. T.* 47, *p.* 78.)

The second stage of hydrophobia commences with the first manifestation of the dread, or aversion of liquids. The ungovernable agitation and distressing sense of suffocation excited by the sight of liquids, the attempt to drink, or even the mere idea of drinking, is unquestionably the most remarkable symptom of the disorder. The patient is also frequently attacked with the same kind of commotion and suffering, from other causes, such as the least agitation of the air, or exposure to a strong light. Indeed, some patients are so much affected by a blast of wind, that they have been known to endeavour to elude it by walking with their backs towards it; (*Hist. de la Soc. Roy. de Méd. p.* 157,) while others scream out whenever the window or door of their room is opened. (*Morgagni De Sed. et Caus. Morb. Epist.* 8, *No.* 28.)

Dr. Marcet, in relating the case of the patient affected with hydrophobia, observes, that "on our proposing to him to drink, he started up, and recovered his breath by a deep convulsive inspiration; yet, he expressed much regret, that he could not drink, as he conceived it would give him great relief, his mouth being extremely parched and clammy. On being urged to try, however, he took up a cup of water in one hand, and a tea-spoon in the other. The thought of drinking out of the cup appeared to him intolerable; but, he seemed determined to drink with the spoon. With an expression of terror, yet with great resolution, he filled the spoon, and proceeded to carry it to his lips; but before it reached his mouth, his courage forsook him, and he was forced to desist. He repeatedly renewed the attempt; but, with no more success. His arm became rigid and immoveable, whenever he tried to raise it towards his mouth, and he struggled in vain against this spasmodic resistance. At last, shutting his eyes, and, with a kind of convulsive effort, he suddenly threw into his mouth a few drops of the fluid, which he actually swallowed. But, at the same instant, he jumped up from his chair, and flew to the end of the room panting for breath, and in a state of indescribable terror." (See *Med. Chir. Trans. Vol.* 1, *p.* 158.) Even the splashing or running of any liquid causes a great deal of inconvenience. As the system becomes more and more affected, the patient loses his sleep entirely, and has frequent and violent fits of anxiety and loud screaming from slight causes. The woman, whom Dr. Powell attended, was often attacked in this way, in consequence of so trivial a circumstance as a fly settling on her face. The noise of tea-cups, or the mention of any sort of drink, greatly disturbed her, though she was not at all agitated by the sound of her urine. The currents of air entering her room, whenever the door opened, became very distressing to her, and this more and more so. The pain in her neck became so great, that she could scarcely bear it to be touched; but she made use of a looking-glass without the inconvenience, which hydrophobic patients usually suffer from the sight of shining bodies. Dr. Powell states, that the paroxysms, which this poor woman suffered, resembled those of hysteria, and increased in duration as the disorder lasted. "She described their commencement to be in the stomach, with a working and fulness there, and that a pricking substance passed up into her throat and choked her; she screamed suddenly, and grasped firmly hold of her attendants, as if voluntarily; and muscular convulsions came on, which were sometimes more, sometimes less general and violent. The causes from which these paroxysms arose were extremely slight; the passage of a fly near her face, the attempt to swallow a pill, a stream of air, the sight of oil or wine, or any other liquids, even the sound of water, and other such circumstances, were sufficient; she now also complained of inconvenience from light, which was accordingly moderated. The effect of sounds was peculiar; for though in the subsequent stages their influence became more general, at this period the effect was rather proportionate to the ideas they excited in her mind, than to their violence. Bells, and other strong noises, did not agitate her, but the clatter of earthenware, the noise of a distant pump, or any thing connected with liquids, produced the paroxysms in all their violence." She could swallow fresh currants with less resistance than any thing else, taking care that they were perfectly dry. Her mind had, till now, been quite calm and composed, and her conversation and behaviour proper, during the intervals of the convulsive attacks. But Dr. Powell was obliged to discontinue the pills of argentum nitratum, in consequence of the sufferings which the attempt to swallow them regularly brought on. Fifteen grains of this substance had been given without any sensible effect. The fits, and the irritability to external objects, increased. The pain shot from the back of the neck, round the angles of the jaws, the chin, and throat. At length the paroxysms became more frequent, and, indeed, might be said to come on spontaneously: seven occurred in one hour. She looked pale and exhausted, and a tremor and blueness of her lips and fingers were observable; her pulse became weaker and more rapid, and her scalp so tender, that touching it brought on convulsions. She had, latterly, eructations of wind, and spit up some thick viscid saliva. Her urine now came away involuntarily, and she was more and more irritable and uncontrollable. Indeed, she passed two hours in almost constant convulsions; became extremely irritable and impatient of every thing about her, complained of failure of her sight; wished to be bled to death; her words were fewer and interrupted; she struck, and threatened to bite, her attendants; had copious eructations of air; discharged an increased quantity of viscid saliva with much convulsive effort; said the affection of her throat and stomach had quite left her; and continued in a general perspiration, with a weak pulse from 140 to 150. She afterward bit some of the attendants, and was therefore confined with a waistcoat. From this period, she had lost all control over her mind, and continued for almost four hours in a paroxysm of furious insanity. She now swallowed, with an effort, near half a pint of water: but this was, in a few seconds, vomited up with some mucus, and a greenish fluid. In this violent raving state, she continued till within two hours of her death, which took place forty-seven hours after the first marked occurrence of hydrophobia." In the course of the case, she swallowed, once or twice, a little porter; and also some cinnamon-water, with tinct. opii; but they were always vomited up. (*Dr. Powell's Case of Hydrophobia.*)

It is by no means uncommon for a period to occur, when the horror of liquids undergoes a considerable diminution, or even entirely ceases; the patient quenching his thirst, and this sometimes as well as if he were in perfect health, and so as to raise doubts of the existence of rabies. But after a few hours, the dread of fluids comes on again, and with it the convulsive paroxysms, which now become general, violent, and incessant. Dr. Cayol attended a girl, labouring under rabies, who was never affected with any very great dread of liquids, nor an absolute inability to swallow them, though she certainly disliked them, and swallowed them with difficulty. (*Journ. de Méd. Chir. &c. Avril*, 1811, *p.* 241.) Nay, patients are sometimes seen, who can manage to swallow red wine and broth, though their aversion to water is already beyond all control; and other patients can sometimes look at a liquid in a black pot without inconvenience; though any fluid offered to them in a glass will bring on a violent paroxysm of spasm and sense of suffocation. The sight of tears has even been enough to bring on the attack. (See *Dict. des Sciences Méd. T.* 47, *p.* 79.)

The question has sometimes been entertained, whether rabies can ever exist quite unattended throughout its course with a dread of liquids? The possibility of such a case was believed by Mead and others, and an instance is recorded by Mignot, in which the patient died, without having manifested any sign of hydrophobia. (See *Hist. de la Soc. Roy. de Med. an* 1783, 2*me Part. p.* 48.) However, it is asserted, that a careful perusal of this case must produce a conviction, that the disorder was not rabies; and it is added, that when the histories of this disease on record are critically investigated, none will be found complete, which do not make mention of a more or less decided aversion to fluids. It also appears from the facts referred to, that the dread of liquids does not depend upon the pain, which the patient has already suffered from his attempts to drink, as it sometimes occurs before any such attempt has been actually made. (*Vol. cit. p.* 80)

An inclination to bite has been noticed, as happening in the patient, whose case is recorded by Dr. Powell. Yet, this disposition is far from being usual; and it never presented itself in any of the cases which fell under the observation of the author of the article *rage* in the foregoing publication, or P. Desault, Duchoisel, Dr. J. Vaughan, Sabatier, Dupuytren, &c. And even when the patient's imagination is so disordered, that he cannot help biting, he commonly warns the bystanders to avoid the danger. The frothy slaver, which is voided with considerable and repeated efforts, is a symptom, which is said not to commence before the respiration begins to be convulsive. As the disease advances, there is no remission of the sputation, necessary to clear the throat of this viscous secretion; and at the approach of death, when it cannot be expelled, it collects in the mouth, and covers the patient's lips.

The symptoms of what is termed cerebral excitement become stronger and more marked in the second stage of the disease. The eyes, the brightness of which is still further increased, appear, as it were, inflamed; the patient never shuts them again; and as the daylight and brilliant colours are offensive, he prefers darkness. The hearing becomes very acute, and as well as the sight, is troubled with hallucinations. The touch is extremely fine; the speech abrupt and rapid; and the conversation energetic, and often expressive of the most touching sentiments. (*Dict. des Sciences Med. T.* 47, *p.* 12.)

Dr. Marshall made a very just distinction between the real convulsions which came on towards the termination of the case in death, and the strong sudden action of the muscles, excited in the course of the disorder by the light, the sight of liquids, and the feel of the air. (*The Morbid Anatomy of the Brain, &c. p.* 88.) Convulsions and hiccough, in fact, are the symptoms of dissolution.

Delirium is far from being a constant symptom, and only happens the last day of the disorder. Neither is it always without remissions; for the patients affected with it sometimes give rational replies. Every case upon record, where delirium is described as being one of the first symptoms, or as coming on with the dread of liquids, is set down on good authority, not as true rabies, but a symptomatic hydrophobia, attended with mania.

The dread of swallowing liquids, though the most singular symptom of the disease, constitutes but a small part of it. It is true, that none, or very few recover, who have this symptom, yet they certainly do not die in consequence of the difficulty of swallowing liquids; for the human body could easily exist double the time, at the end of which the disease usually proves fatal, without food or drink. Besides, the sick can often swallow substances that are nourishing, in a pulpy state, without, however, having their life thereby at all prolonged. It is not, therefore, the difficulty, or impossibility of swallowing liquids; but the effects of the poison upon the constitution at large, which occasion death. (*Dr. J. Hunter in Trans. for the Improvement of Med. Knowledge, Vol.* 1, *p.* 305.)

The extreme sensibility of the sick to all impressions, appears in the displeasure which they express at even the air blowing upon them; in their dislike to a strong light; in their aversion to new faces, or even the sight of their friends and relations; and in the terror they express at being touched, which almost threatens to throw them into convulsions. As the disease advances, the mind is more and more filled with dreadful fears and apprehensions. (*Op. cit. p.* 307.)

In the second stage, the epigastrium, as well as the chest, is the seat of considerable pain; the patient is constipated, but the urine is plentiful and high coloured. Before a certain period, the pulse is generally strong, regular, and a little accelerated; but towards the end of the case, it becomes small, irregular, feeble, and rapid. (See *Dict. des Sciences Méd. T.* 47, *p.* 83.)

The duration of life, from the appearance of hydrophobia till death, varies from thirty-six hours to four or five days: the most common period is from two to three days. (*Dr. J. Hunter, Op. cit. p.* 308.) The event is said to be directly caused by asphyxia, or the cessation of respiration. Of ten persons, who were bitten by the same animal, nine died on the second and third day, from the commencement of the horror of fluids, and only one on the fifth day. There is an account of a child at Senlis, who lived nine days, but the description of the case, and the circumstance of fourteen worms being found in the intestines, may raise doubts about the nature of the disease. (See *Hist. de la Soc. Roy. de Med. p.* 209, 155.)

Whatever may be the resemblance found between rabies and hydrophobia, with regard to the rapidity of their course, their causes, and some of their symptoms, the following considerations as a modern writer observes, will always serve for the discrimination of one disorder from the other: tetanus attacks the muscles of the jaw, which remains motionless, while in rabies, the jaw is not only moveable, but incessantly moving, in consequence of the efforts unremittingly made by the patient to free his mouth from the thick saliva with which it is obstructed. In this last disorder, the muscles are alternately contracted and relaxed; but in tetanus, they always continue rigid. Tetanus is rarely attended with any aversion to liquids, and the patient may be kept for a long time in a bath without inconvenience; and the paroxysms are neither excited, nor increased by a vivid light, a noise, the patient's being touched, or the sight of water, or shining surfaces. In addition to these differences, it is to be remembered, that tetanus is most frequent in warm climates, and that it mostly comes on a few days after the receipt of a local injury, and may occur as a complication of any kind of wound, even that which is made in a surgical operation. (See *Dict. des Sciences Med. T.* 47, *p.* 86.)

On the subject of prognosis, with respect to the bite inflicted by a rabid animal, and its effects, as evinced in the decided form of rabies, there are several things worthy of attention. According to some writers, small wounds are not less dangerous than others, and an attempt is made to account for the fact, by the more copious hemorrhage from larger wounds, and the frequent neglect of lesser injuries. Perhaps another reason is, that the virus is more likely to be confined in a wound with a small orifice, than in one which is ample, and admits of being more effectually washed. The more numerous the wounds are, the greater is the risk. If it be inquired, what is the average number of persons attacked with rabies out of a given number who have received bites? The question can only be answered by referring to the extremes. Thus, Dr. J. Vaughan speaks of between twenty and thirty individuals, bit by a mad dog, of whom only one was afterward attacked with rabies; and Dr. J. Hunter tells us of an instance, in which out of twenty-one persons bit, only one became affected. (See also *Fothergill in Med. Obs. and Inq. Vol.* 5, *p.* 195.) On the other hand, out of fifteen persons bit by a mad dog and taken care of at Senlis, three at least were seized with the disorder, (*Hist. de la Soc. Roy. de Med. p.* 130;) of seventeen others bit by a wolf, ten were attacked; (*ib. p.* 130;) and of twenty-three, bit by a she-wolf, thirteen died of rabies. (*L. F. Trolliet, Nouveau Traité de la Rage, &c. Obs. Chirurgique, &c. No.* 25.)

Two important facts should always be recollected; viz. the disease may often be prevented; it can hardly ever be cured. Experience has fully proved that when hydrophobia once begins, it generally pursues its dreadful course to a fatal termination, the records of medicine furnishing very few unequivocal and well-authenticated cases to the contrary. Hence, the imperious necessity of using every possible means for the prevention of the disorder.

Probably, however, many things which possess the character of being preventive of hydrophobia, have no real claim to such reputation. I would extend this observation to all internal medicines, mercurial frictions, and plunging the patient for a considerable time under water.

The instances, in which a prevention is inferred to have taken place by different writers, in consequence of such means, may all be very rationally ascribed to other circumstances. Facts already cited sufficiently prove, that out of the great number of persons frequently bitten by the same dog, only a limited proportion is commonly affected. The hydrophobic poison is known to reside in the saliva of the animal; consequently, the chance of being affected must greatly depend upon the quantity of this fluid which is insinuated into the wound; and if the teeth of the animal should have previously pierced a thick boot, or other clothing, before entering the skin, the danger must be obviously much diminished. Many patients wash and suck the wound, immediately after its occurrence, and thus, no doubt, very often get rid of the poison. Even when it is lodged in the wound, it may not be directly absorbed, but be thrown off with the discharge. All prudent patients submit to excision of the bitten part. Now, under each of the above circumstances, escapes have frequently occurred, while internal medicines, half drowning or salivating the patients, had also not been neglected, so that all the efficacy of preventives has too often been most unjustly ascribed to means, which probably never yet had, and never will have, any beneficial effect whatever. What confirms the truth of the preceding statement is these facts: that persons bitten by the same animal have sometimes been treated exactly on the same plan; some of them escaped the disease; others had it, and of course perished: on other occasions, some of the patients, bitten by the same animal, have been treated in a particular way, and have escaped hydrophobia; while others bitten at the same time by the animal, also never had any constitutional effects, although they took no medicines, nor followed any other particular plan.

If to these reflections be added the consideration, that it is frequently doubtful, whether the bite has actually been inflicted by a truly rabid animal, and that the mental alarm will sometimes bring on a symptomatic hydrophobia, it is easily conceivable, how mistaken a person may be, who believes that he has prevented the disorder, and how unmerited is the reputation of the means, which he has employed for the purpose.

The bite of a naturally ferocious beast has often been thought to be attended with more risk than that of an animal naturally tame; and hence the bite of a wolf is said to be more frequently followed by rabies, than that of a dog. This proposition is admitted to be true; but the explanation is erroneous. The true reason of the difference is, that a wolf usually seizes the face, and inflicts a deeper bite; while a dog only snaps as he runs along, and mostly bites through the clothes. (See *Dict. des Sciences, Med. T.* 47, *p.* 88.) The bite of a rabid animal may be rendered much more dangerous by being situated near a part, or an organ, which increases the difficulty, or risk, of adopting an effectual mode of removing the whole of the flesh, in which the virus may be lodged. Thus, bites near the large arteries, the eyes, the joints, &c. are of a more serious description than others. Dr. J. Hunter rated the hazard in some degree by the vascularity of the bitten parts. The prognosis will always be more unfavourable, when no proper measures have been applied to the bite soon after its infliction, and perhaps the risk may be increased by certain causes not having been duly avoided, which, as already stated, are thought to have a tendency to accelerate the attack of rabies. The exact time after a bite, when the prevention of rabies is no longer practicable, is quite an undetermined point; but every fact known upon the subject, evinces in an urgent manner the necessity of adopting preservative measures without the least delay.

In almost all the dissections of patients, who have died of rabies, certain indications of inflammation have been perceptible; more frequently, in some part of the space between the pharynx and the cardiac orifice of the stomach, in the stomach itself, in the lungs, the choroid plexus and membranes of the brain. (See *Med. Repository Vol.* 3. *p.* 51.) M. Trolliet opened with the greatest care six bodies of persons destroyed by this disease. The mouth and fauces in each subject were first examined, and found of a pale grayish colour scarcely lubricated with mucus, and quite free from all frothy matter. All the salivary glands seemed perfectly healthy. When the larynx, trachea, and bronchiæ were opened, they appeared to have been the seat of inflammation, the traces of which were the most marked low down, where the mucous membrane was of the colour of wine-lees. In four of the bodies, frothy mucus was perceived in the bronchiæ, larynx, and trachea. Trolliet infers from these appearances, that the frothy matter seen about the mouths and lips of patients affected with rabies, is secreted by the inflamed mucous membrane of the bronchiæ, and that it is this secretion, and not the real saliva, which contains the hydrophobic poison. (*Nouveau Traité de la Rage, &c.*) In giving an account of a dissection, Faure also long ago remarked, that the frothy matter was only met with in the air-passages, that the salivary organs were unaffected, and that the saliva itself did not contribute to the formation of the thick slaver, which appeared to have issued from the chest. (*Hist. de la Soc. Roy. de Méd. ann.* 1783, *p.* 39.) From the preceding observations, and those of Mignot de Genety (*Vol. cit. p.* 54,) Morgagni (*De Sedib et Caus. Morb. Epist.* 8, *art.* 20, 25, 30,) Darlue (*Journ. de Med. de Vandermonde, T.* 4, *p.* 270;) B. Rush; and Dupsey (*Obs. Inédites, No.* 138) it would appear:

1. That the mouth, strictly so called, and the salivary glands, are without any alteration.

2. The mucous membrane of the air-passages is affected with inflammation, which in its highest degree extends from the division of the bronchiæ to the pharynx. When the inflammation is of less extent, the pharynx appears sound; and when yet more limited, it is usually not to be traced in the larynx. The point where it seems to commence and is most strongly marked, is at the lower part of the trachea, or in the bronchiæ. Lastly, when none of these parts are found inflamed, the lungs themselves present vestiges of inflammation.

With respect to the theory of Trolliet, wherein the hydrophobic poison is said to be contained in the mucous secretion voided from the lungs, and to be the product of inflammation of the membrane of the bronchiæ, and not derived from the salivary glands; the question requires the confirmation of experiment; for, though the salivary glands are not the seat of pain, swelling, &c. it by no means follows, that their secreting process may not have been subject to some peculiar modification, on which the production of the hydrophobic virus depended. Thus, severe and obstinate ptyalisms often occur, and yet there is no manifest change in the state of the salivary glands. According to Van Swieten and Mead, there are also sometimes no morbid appearances either in the head, fauces, chest, or stomach. (*Comment. in Boerh. T.* 3, *p.* 562.)

In three cases, out of six, the lungs were found emphysematous, that is to say, their interlobular substance was distended with air, and the pleura pulmonalis raised into a great number of transparent vesicles on the surface of the lungs. In a fourth instance, the emphysema was not observed in the lungs themselves, but in the cellular substance between the two layers of the mediastinum; and under the muscles of the neck. Morgagni also noticed vesicles of air on the surface of the lungs of a person, that died of hydrophobia. (*De Sed. et Caus. Morb. Epist.* 8, *art.* 30.) M. Trolliet presumes, that this emphysema is occasioned by the rupture of one of the air-cells, in the convulsive efforts of respiration, as sometimes happens when a foreign body is lodged in the larynx. (See *Cases by Louis and Lescure in Mém, de l'Acad. de Chir. T.* 4, *p.* 538; *T.* 5, *p.* 527.)

The lungs were of a deep-red colour in all the six subjects dissected by Trolliet, and they were observed to be gorged with blood in cases reported by numerous writers: as Bonet (See *Van Swieten, T.* 3, § 1140;) Boerhaave (*Op. Omn. p.* 215;) Morgagni (*De Sedibus et Caus. Morb. Ep.* 8, *art.* 23, *&c.*;) Mead, Darlue (*Recueil Period, &c. T.* 3. *and* 4;) Faure (*Hist. de la Soc. Roy. de Med. p.* 39;) De la Caze (*ib. p.* 69;) Portal, Oldknow, Ballingall (*Edinb. Med. and Surg. Journ.* :) Marshall (*Morbid Anatomy of the Brain, &c. p.* 69;) Gorey (*Journ. de Med. Chir. T.* 13, *p.* 83;) Ferriar (*Med. Hist. and Reflections, &c.*) "Pulmones in quinque nigri ex toto, aut magnâ parte (says Morgagni,) in quatuor magnâ item ex parte sanguine pleni." With respect to the state of the organs of the circulation, in three of the cases dissected by Trolliet, a good deal of air escaped from the heart and aorta. Morgagni is supposed to be the only other writer, who has noticed a similar occurrence (*Epist.* 8, *No.* 30,) and who also in another case saw air escape from beneath the dura mater. (*Ib. No.* 23.) In two of Trolliet's cases, some gelatinous clots were found in the heart and large vessels; but the great mass of blood was black, and very fluid in the heart, arteries, and veins, as in subjects, who have died of asphyxia. In all the six cases, traces of inflammation were noticed in the brain, or its membranes. The sinuses were filled with a dark-coloured fluid blood; and the pia mater was much injected, and of a brownish hue. The same appearances were found above the cerebellum, and the vessels on the investment of the medulla spinalis were considerably enlarged. The surface of the cerebrum was also studded with scarlet spots, which appeared to arise from blood effused from the small vessels of the pia mater into its cellular substance. In two subjects, blood was extravasated towards the base of the brain in larger quantity. The plexus choroides was gorged with blood, and of a brown colour. Besides those and other changes, Trolliet remarked, in two of the cases, a thickening of the pia mater. The substance of the brain was generally softer than usual; but the fluid in the lateral ventricles was not in large quantity, though, in two cases, it had a bloody tinge. The late Dr. Marshall believed that in rabies, the brain was the part principally affected. (*Op. cit. p.* 145.)

Hufeland conjectured, that, in hydrophobia, the medulla spinalis is the part originally affected, whence the effects of the disease are propagated to the nerves of the trunk. (*Bibl. Méd. T.* 55, *p.* 395, *&c.*) Dr. R. Reid believed, that an alteration of the spinal marrow was essentially concerned in the disease. (*On the Nature, &c. of Tetanus of Hydrophobia,* 8vo. *Dublin,* 1817.) A case was also published by M. Matthey, of Geneva, in which a quantity of serum was found within the spinal canal. (*Journ. Gen. de Méd. T.* 54, *p.* 279.) See on this subject some observations by Dr. Abercrombie. (*Edinb. Med. and Surg. Journ. Vol.* 14. *p.* 66.)

According to Trolliet, the traces of inflammation in the digestive organs are not so constant as in the lungs and brain. In none of the six cases dissected by him, was there any appearance of inflammation in the pharynx, though some parts of the alimentary canal were affected in this manner. The cases recorded, however, in which the digestive organs presented considerable morbid appearances, are very numerous. Thus Joseph de Aromatarius, Darlue (*Recueil Période, T.* 3, *p.* 189, *et T.* 4, *p.* 270,) Sauvages (*p.* 107,) Professor Rossi, M. Gorci (*Journ. de Med. Chir. &c. T* 13.) and Dr. Powel (*Case of Hydrophobia,*) found inflammation either in the pharynx, or œsophagus, or both these tubes. Dr. Powell's words are, "the œsophagus was rather redder than natural, and covered with a thin layer of coagulable lymph." A similar coat of lymph was also found by Oldknow (*Edinb. Med. and Surg. Journ. Vol.* 5, *p.* 280,) Ballingall (*Op. cit. Vol.* 11, *p.* 76,) Dr. Ferriar (*Med. Hist. &c. Vol.* 3, *p.* 27.) In dogs, Dr. Gillman found the pharynx and œsophagus in a state of inflammation. (*On the Bite of a Rabid Animal, p.* 13, 23, 26, 44.) It is conjectured, that in many of these instances, the inflammation extended to the œsophagus from the trachea and bronchiæ. (*Dict. des Sciences Med. T.* 47, *p.* 98.) Inflammation of the mucous membrane of the stomach and small intestines, has likewise been very generally noticed, as may be seen by referring to the accounts published by Morgagni, Powell, Oldknow, Ferriar, Ballingall, Marshall, &c. In dogs, the same fact was remarked by Dr. Gillman (P. 13, 31, 44;) sometimes, however, according to this last author, no vestiges of inflammation, nor any other morbid appearances, are discoverable in the examination of animals that have died of rabies. (P 83.) Dupuytren is stated to have found the mucous membrane of the stomach and bowels inflamed in several places, and even almost gangrenous. (*Dict des Sciences Med. T.* 47, *p.* 98.)

From recent investigations, made at the veterinary school at Alfort, by Professor Dupuy, the following are the usual morbid appearances, noticed in the dissection of dogs, horses, cows, and sheep, destroyed by rabies. 1. The lungs and brain universally gorged with blood. 2. Greater or lesser remarks of inflammation in the mucous membrane of the bronchiæ, trachea, larynx, throat, œsophagus, stomach, and frequently even in that of the bowels, vagina, uterus, and bladder. 3. The air-passages filled with frothy mucus. 4. A collection of serum in the ventricles of the brain, and sometimes even between the membranes, covering the spinal marrow. 5. An unusual redness of the investment of the pneumogastric and trisplanchnic nerves. (See *Dict. des Sciences Med. T.* 47, *p.* 99.)

Happily, surgery possesses one tolerably certain means of preventing hydrophobia, when it is practised in time, and in a complete manner. Every reader will know, that the excision of the bitten parts is the operation to which I allude. Indeed, as hydrophobia is often several months before it begins, the wounded parts should, perhaps, always be cut out, even though they are healed, and some weeks have elapsed since the accident, provided no symptoms of the hydrophobia have actually commenced. The operation should be done completely; for a timorous surgeon, afraid of cutting deeply enough, or of removing a sufficient quantity of the surrounding flesh, would be a most dangerous one for the patient. All hopes of life depend on the prevention of the disorder; for in the present state of medical knowledge, none can rest upon the efficacy of any plan, except the extirpation of the part. For this purpose, caustics have sometimes been employed. However, as their action can never be regulated with the same precision as that of the knife, and consequently, they may not destroy the flesh to a sufficient depth, excision should always be preferred. The latter method is also the safest for another important reason, viz. the part, and poison lodged in it, are removed from the body at once; but when the cautery or caustic is used, the slough must remain a certain time undetached. Some surgeons are not content with cutting out the part: but after the operation, fill the wound with the liquor ammoniæ, or cauterize its surface, for the sake of greater security. How late excision may be done with any prospect of utility I am not prepared to say; but, there are practitioners, who deem excision right, even when heat, irritation, or inflammation is observed in the bitten part. (See *Med. Repository, Vol.* 3, *p.* 54.)

Cases present themselves, in which it is even preferable to amputate the limb, than attempt to extirpate either with the knife, or cautery the whole of the bitten parts; an endeavour, which could not be accomplished with any degree of certainty. Thus, as Delpech observes, when the hand or foot has been deeply bitten in several places, it is obvious, that it would be impossible to make caustic, (or the cautery) certainly reach every part, which the saliva of the rabid animal may have touched. Besides, the mischief resulting both from the injury, and the other proceedings together, might be such as to afford no prospect of saving the limb, or at least, of preserving it in an useful state. (See *Precis Elem. des Mal. Chir. T.* 2, *p.* 133.) I have known of one or two cases, in which the patients lost their lives, in consequence of the excision, or destruction of the bitten parts not having been attempted, on account of the surgeon's reluctance to cut tendons, or wound a large artery, as one of those at the wrist. In such cases, however, the fear of rendering a muscle useless, or of wounding an artery, is no justification of leaving the patient exposed to a danger, so surely fatal, as that of the hydrophobic virus, if it once affect the constitution. The artery should be exposed for a sufficient length, and secured with two ligatures, when the requisite extirpation of the parts between them may be safely performed.

When once the hydrophobic symptoms have commenced, there is little or no hope of saving the patient, the disease having almost invariably baffled every plan of treatment, which the united talents of numerous medical generations have suggested. All the most powerful medicines of every class have been tried again and again; mercury; opium; musk; camphor; arsenic; the nitrate of silver; cantharides; belladonna; ammonia; plunging the patient in the sea; bleeding; &c. &c.

The inefficacy of opium is now generally acknowledged: in the space of fourteen hours, Dr. J. Vaughan gave one patient fifty-seven grains of opium, and also half an ounce of laudanum in a clyster, but the fatal termination of the disease was not prevented. Dr. Babington even prescribed the enormous quantity of 180 grains in eleven hours, without the least amendment, or even any narcotic effect. (*Med. Records and Researches, p.* 121.) On the very first day, that rabies decidedly showed itself in a man, who had been bit by a mad dog, Dupuytren injected into the vena saphena, by means of Anel's syringe, two grains of the extract of opium dissolved in distilled water, and as a degree of calm appeared to be the result, four grains more were thrown into the cephalic vein. The patient remained perfectly tranquil three hours longer; but the symptoms afterward recurred with increased violence. The next morning, about six or eight grains more were dissolved, and thrown into the circulation; but, all was in vain, as the patient died in three quarters of an hour after the last injection. (See *Dict. des Sciences Med. T.* 47, *p.* 131.)

As for belladonna, its employment for the prevention and cure of hydrophobia is very ancient, its external use for this purpose having been mentioned by Pliny, and its internal exhibition, with the same view, by Theod. Turquetus in a posthumous work published in 1696. (See *Praxeos Medicæ Syntagma, &c.*) In 1763, belladonna was recommended by Schmid as a remedy for hydrophobia, and in 1779 by J. H. Munch. (See *Richter's Chir. Bibl.*) At present, this medicine, has entirely lost its character of possessing any power against hydrophobia.

Of late years, the public hope has been raised by the accounts given of the virtue of hydro-chlorine, or oxymuriatic acid. Wendelstadt even published the story of an Englishman, who allowed himself to be bit several times by a mad dog, and then saved himself by washing the bites with this acid. And, still more recently Professor Brugnatelli, in the Italian Journ. of Physic, Chymistry, &c. (*T.* 9, *p.* 324,) has published some observations, tending to prove the efficacy of the external and internal employment of the medicine for the prevention of rabies.

The bites are washed with it, and then covered with charpie wet with it. And, when the symptoms commence, if it could not be swallowed in a fluid form, Brugnatelli gives bread pills imbued with it. For a child eight years old, the dose is ℈ij four or five times a day, but gradually increased. According to Orfila, hydro-chlorine was long since recommended by Cluzel, as an internal remedy for hydrophobia. (*Sécours à donner aux personnes empoisonnées*, &c. 8vo. *Paris*, 1818, *p.* 153.) With regard to Brugnatelli's cases, they are said to be so destitute of precision and certainty, that no inference can be drawn from them. (*Dict. des Sciences Méd. T.* 47, *p.* 119.) In order to give hydro-chlorine a fair trial, it was used internally and externally on seven patients in the Hôtel-Dieu at Lyons in 1817. The bites were washed and bathed with it, and some of them also cauterized; and each patient took daily a dram of the acid, made into an agreeable sweetened drink. All these unfortunate individuals afterward died of rabies, though the treatment was begun the day after the receipt of the wounds. (*L. F. Trolliet, Nouveau Traité de la Rage*, &c.) The excision of the bites 70 hours after their infliction, and washing the wound with oxymuriatic acid, did not in Dr. Johnson's case prevent the disease. (See *Edinb. Med. and Surg. Journ. Vol.* 15, *p.* 212.) In America, the plant scutellaria lateriflora has been lately extolled, as a certain specific for hydrophobia. (See *A History of the Introduction and Use of Scutellaria Lateriflora, as a remedy for preventing and curing Hydrophobia, by Lyman Spalding, M. D. New-York*, 1819.) The prussic, or hydrocyanic acid has likewise been proposed, on account of its reputed antispasmodic properties; but, some experiments, made with it on dogs by Dupuytren, Magendie, and Breschet, furnish no results in favour of its being likely to prove useful in the present disorder. (See *Dict. des Sciences Méd. T.* 47. *p.* 132.) By Dr. Rossi, of Turin, the trial of galvanism was suggested. (*Alibert, Nouveaux Elémens de Thérapeutique, T.* 2, *p.* 436, *Ed.* 4;) yet, the only fact brought forward, as an encouragement to persevere with the last means, appears to a modern author, from its symptoms and progress, not to have been a case of rabies. (*Dict cit T.* 47, *p.* 126.) The rapid and powerful effects of the bite of a viper on the whole system, and perhaps the idea, that the operation of this animal's venom might counteract that of the hydrophobic virus, led some experimenters to try what would be the result of subjecting patients, affected with rabies, to the bite of that kind of snake. The project, however, was attended with no success. Three cases of this description were communicated to the Royal Society of Medicine, (*Hist. p.* 201;) two additional ones were recorded by Dr. Gilibert, physician to the Hôtel-Dieu at Lyons, (*Advers. Méd. Pract. p.* 257;) and Viricel, surgeon of the same hospital, repeated the experiment on a child, which yet fell a victim to hydrophobia. Other trials are also said to have been made in France and Germany with no better success. Dr. de Mathiis, in the year 1783, let a viper bite a rabid dog on the throat. The dog's head was attacked with considerable swelling, the hydrophobia ceased, and, according to some accounts, the animal perfectly recovered; but, according to other statements, though it drank freely as soon as its head had swelled, it only survived the experiment a few hours. (See *Dict. des Sciences Méd. T.* 47, *p.* 126.)

Some facts which occurred a few years ago in the East Indies, tended for a time to raise an expectation, that a copious abstraction of blood might be the means of preserving patients actually attacked with this fatal disorder. Mr. Tymon, assistant surgeon of the 22d Light Dragoons, tried successfully the method of taking away at once an immense quantity of blood from the patient, "I began by bleeding him (says Mr. Tymon) *until scarcely a pulsation could be felt in either arm.*" Opium was afterward given, and the patient salivated with mercury. (See *Madras Gazette of Nov.* 23, 1811.)

Although in the observations, annexed to this case by Dr. Berry, there are some circumstances which render it probable, that the case was really hydrophobia; yet, as the successful termination of it is an event so extraordinary, I much regret, that some desirable information is omitted. For instance, we have no account of any pain, or changes, in the bitten part, or limb, at the first coming on of the indisposition. The early constitutional symptoms are not described, and the violent spasms, screaming, &c. are the first things mentioned. Some particulars of the dog would also have been interesting.

Such information, indeed, becomes still more essential, when we find it stated, that another man, Serjeant Jackson, was also bitten by the same dog, and had hydrophobia *in a mild form*, from which he recovered under the use of mercury, blisters to the head, and cathartic injections, without any recourse to bleeding at all. This last case is even more contrary than the former, to what general experience teaches; because mercury, blisters, and injections, have been tried a thousand times unavailingly; while, perhaps, blood-letting, *in the manner practised by Mr. Tymon*, is a new treatment. Dr. Schoolbred, of Calcutta, published a second case of hydrophobia cured by bleeding ad deliquium animi, and afterward exhibiting calomel and opium. The patient, being threatened with a relapse, was largely bled again. The whole of the success is imputed by Dr. Schoolbred to the venesection. But this gentleman is not so sanguine as to believe that bleeding will cure every case of hydrophobia. It is probable, that there is a period, beyond which its curative effect cannot extend, and, therefore, it is upon the first appearance of unequivocal symptoms of the disease, that he thinks copious bleeding affords a prospect of success, while the delay of only a few hours may prove fatal. He observes, that the medical profession, taught by numerous disappointments, admit very cautiously the claims of any new practice to general adoption. If several patients in hydrophobia, therefore, should happen to be bled in an advanced stage of the disease, and die, (as they inevitably would do, whether they had been bled or not,) such cases would be quoted against the new practice, as failures. But Dr. Schoolbred rightly contends, that numerous failures in an advanced stage of the disease can form no just ground for the rejection of a remedy, which has incontestably effected a cure in an earlier stage of the disorder. He insists upon the necessity of making a large orifice in the vein, so as to evacuate the blood quickly, which must be allowed to flow, without regard to quantity, ad deliquium animi.

Dr. Schoolbred was well aware, that bleeding in cases of hydrophobia had often been tried. But, says he, owing probably to the evacuation not having been pushed far enough, when used in the early stage of the disease; or to the period for its beneficial employment having elapsed; the cases, in which it was tried, afforded little or no encouragement to the continuance of the practice.

Since the preceding cases, the effect of bleeding has had the fairest trials made of it, and some of the reports are in favour of its occasional utility. (See *Particulars of the successful Treatment of a case of Hydrophobia, by R. Wynne, 8vo. Shrewsbury*, 1813; *Also Edmonstone in Lond. Med. Repository, Vol.* 3, *p.* 93.) In almost every instance, however, it fails in hindering the usual melancholy event. (See *Kirrison's Case and Obs. in Med. Repository, Vol.* 2, *p.* 197.) This unpleasant truth, I think, receives confirmation from the fact, that the practice is far from being new.

Dr. Mead, who was very confident that he had found an infallible preventive of the disease *in a little liverwort and black pepper*, aided by bleeding and cold bathing before the commencement of the course of medicine, says, "as to all other ways of curing the hydrophobia, I own I have not been so happy as to find any success from the many I have tried. Bathing at this time is ineffectual. *I have taken many large quantities of blood;* have given opiates, volatile salts, &c. All has been in vain, *because too late.*" Notwithstanding his disappointment, he concludes, "if any relief could be expected in this desperate state, I think it would be *from bleeding, even ad animi deliquium,*" *&c.*

The doctrines of Boerhaave also led him and his pupils to recommend and practise bleeding in hydrophobia. "The distemper (says he) is to be treated as one highly inflammatory, upon the first appearance of the signs which denote its invasion, by *blood-letting from a large orifice, continued till the patient faints away;* and soon after by enemata of warm water and vinegar, &c. and he adds, "that this practice is supported by some small number of trials." But the particulars of this successful practice, are not given.

Dr. Schoolbred finds, that a trial of it was made at Edinburgh, more than sixty years ago, by Dr. Rutherford who took away gradually sixty ounces of blood from a patient, who had already been bled the same morning. As the patient lived forty-eight hours after the large bleeding, the method was probably tried somewhat early in the disease; and the case may therefore be set down as a fair instance of a failure of the practice. The trials, which have been made in this country of the practice of bleeding, in cases of hydrophobia, since the receipt of the above reports from India, I am sorry to say, have not confirmed its efficacy, as a means which can be much depended upon for saving the patients.

Bleeding was also recommended in cases of hydrophobia, by Poupart. (See *Hist. de l'Acad. Royale des Sciences, pour l'année* 1699, *p.* 48.) The practice is likewise mentioned in the *Medical Essays of Edinburgh, Vol.* 5, *part* 2, § 5; *and in the writings of Dr. Rush.* See also *Dr. Burton's Case, Phil. Mag. August,* 1805.

After all that has been said, and the little confidence assigned to any practice but that of the early excision, or amputation of the bitten parts, it is necessary, that something should be done after the actual commencement of rabies, and that every practitioner should be prepared for the adoption of some mode of treatment, or another. As however, my own mind is not made up upon the subject, I prefer offering a conclusion or two, made by a modern critical writer: "That experience authorizes the placing confidence in bleeding ad deliquium; on vomiting; and perhaps on use of atropa belladonna; and, on tobacco exhibited as a glyster. That it is probable, advantage would result from the combined employment of bleeding, vomiting (see *Dr. Satterly's Obs. in Medical Trans. Vol.* 4,) and purging in the early stage of the disease. That analogy recommends the trial of spirit of turpentine in the convulsive stage of the disease." (*Med. Repository, Vol.* 3, *p.* 54.) *Jos. de Aromatarius, De Rabie Contagiosa, 4to. Francof.* 1626. *Sauvages sur la Rage, 12mo. Paris,* 1771. *James on Canine Madness, 8vo. Lond.* 1780. *Mead on the Bite of a Mad Dog. Jos. S. Dalby, The Virtues of Cinnabar and Musk, against the Bite of a Mad Dog, 4to. Birmingh.* 1764. *J. Heysham, De Rabie Canina, Edinb.* 1777. *B. F. Münch. De Belladonna, efficace in Rabie Canina remedio, Frank. Del. op.* 1. *D. P. Layard, Essay on the Bite of a Mad Dog, 2d Ed.* 1763. *R. Hamilton, Remarks on Hydrophobia,* 2 *Ed.* 2 *Vols. 8vo, Lond.* 1798. *Medical Museum, Vol.* 2. *Lond. Med. Trans. Vol.* 2 *and* 4, *Ed.* 2. *Med. Obs. and Inq. Vol.* 3; *and Fothergill in Vol.* 5 *of the same work. C. Nugent, Essay on Hydrophobia; to which is prefixed, the Case of a Person cured, 8vo. Lond.* 1753. *Le Roux, sur la Rage, 8vo. Dijon,* 1780. *Idem. Traitement local de la Rage, 8vo. Paris,* 1783. *Edinb. Med. Comment. Vol.* 5, *p.* 42. *J. Vaughan's Cases and Obs. on Hydrophobia, 8vo. Lond.* 1778. *Dr. Powell's Case of Hydrophobia. Latta's System of Surgery, Vol.* 3. *Cullen's First Lines, Vol.* 4. *Enaux et Chaussier, Mé-*

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HYDROPHTHALMIA. (from ὕδωρ, water, and οφθαλμος, the eye.) *Dropsy of the Eye. Hydrophthalmus; Hydrophthalmos.* Also *Bupthalmos,* or Ox-eye. As in other organs, dropsy of the eye arises from a disproportion taking place between the action of the secerning arteries, by which the fluid is deposited in the part, and the action of the absorbent vessels, by which it is taken up and returned to the circulation; and, according to this principle, the disease may be supposed to depend, either upon secretion being made too rapidly, or absorption being slower than is proportionate to the natural activity of the vessels by which the secretion of the humours of the eye is effected.

According to Beer, dropsy of the eye is seldom entirely a local disease, but at least is generally combined with an unhealthy constitution, or is a mere symptomatic effect of some other dropsical affection, anasarca, hydrocephalus, &c. Sometimes it appears as a symptom of chlorosis. Beer adds, that the disease may originate either from a preternatural accumulation of the aqueous humour; from that of the vitreous humour; or from an immoderate accumulation of both these humours together. (*Lehre von den Augenkr. B.* 2, *p.* 616, *Wien.* 1817.) When the vitreous humour collects in this manner, it usually loses its natural consistence, and becomes thinner and more watery. (*Richter, Anfangsgr. B.* 3, *p.* 392.)

Professor Beer states, that in the case proceeding from a morbid quantity of the aqueous humour, the first indication of the disease is an increase in the dimensions of the cornea, attended with a manifest enlargement of the anterior chamber. The cornea may become in this manner two, three, or even four times wider than natural, without bursting or losing its transparency; for, though a turbid appearance is discernible, this depends rather upon the state of the aqueous humour itself. The iris, which, in the very commencement of the disease, begins to lose its mobility, soon becomes completely motionless, and acquires a duller colour; the pupil always remaining in the mid-state between contraction and dilatation. In the eyeball, an annoying sense of pressure, tension, and heaviness is felt, rather than actual pain. In the beginning of the disease, there is a considerable degree of farsightedness, or præsbyopia, which soon changes into a true amaurotic weakness of sight, but never terminates in perfect amaurosis. The free motions of the eyeball are more and more interrupted, in proportion as the organ grows larger, and it has invariably a hard feel, while the sclerotica, to the distance of two lines from the margin of the cornea, is as bluish as it is in the newborn infant.

Respecting the precise cause of the accumulation of the aqueous humour, Beer offers no observation worthy of repetition, excepting perhaps that in which he reminds us, that a similar collection happens apparently as an effect of the conical staphyloma of the whole cornea. (See also *Wardrop's Essays on the Morbid Anatomy of the Eye*, *Vol* 2, *p.* 19.) Indeed, as far as our knowledge yet extends, it is impossible to say whether the changes of the cornea are, in the present disease, to be regarded as the cause or the effect of the increased quantity of the aqueous humour, or whether, as seems to me most probable, both phenomena are only effects of one and the same cause. The examples, somewhat repugnant to this idea, are those referred to by Beer, as symptomatic of other dropsical affections. On the other hand, Mr. Wardrop has never seen a preternatural collection of the aqueous humour, without its being accompanied with disease of the coats of the eye. (*Vol. cit. p.* 20.)

In hydrophthalmia, the prognosis is generally unfavourable, and, when the sight is nearly or quite lost scarcely any hope can be entertained, either of restoring vision or preserving the shape of the eye. Yet, according to Beer, things are not always quite so unpromising in the preceding form of the disease, especially when the surgeon is consulted in time, and the patient's constitution is not exceedingly impaired. The same experienced author has never seen any instance in which the eye spontaneously burst; on the contrary, when the habit was decidedly bad, and the treatment ineffectual, the disease became gradually conjoined with the second species of dropsy of the eye, and terminated in a frightful disfigurement of the whole organ, and death. On dissection, the innermost textures of the part were found spoiled and disorganized, and sometimes even the orbit itself carious. (*Vol. cit. p.* 619.) With respect to the treatment, Beer thinks, that this must depend very much upon the nature of the primary disease, to which the dropsical affection is ascribable as an effect. He has known great benefit sometimes produced by the submuriate of mercury, combined with digitalis, and a drink containing supertartrate of potassa, and borax. When the disease has been preceded by the sudden cure of any cutaneous disease, he has faith in the method of attempting to restore the affection of the skin by inoculation, or, if that be impracticable, by stimulating its surface with antimonial ointment, or making an issue. This plan is to be aided with internal alterative medicines, such as camphor, the sulphur auratum antimonii, and flowers of sulphur. The local applications, which he prefers in the early stage, are warm dry bags filled with aromatic herbs, and rubbing the parts about the eyebrow, sometimes with mercurial ointment, sometimes with a mixture of æther and liquor ammoniæ. But, when the disease has made considerable progress, and vision is either weak or nearly lost, while the sclerotica, near the cornea is not much discoloured, and there are no appearances of a varicose affection of the blood-vessels of the organ, Beer recommends making a puncture with a small lancet in the lowest part of the cornea, half a line from the sclerotica, so as to discharge the aqueous humour. The anterior chamber is then to be kept empty for several days or weeks, if possible, by reopening the small wound every day with the point of the lancet. (See also *Richter's Anfangsgr. B.* 3, *p.* 403.) After the operation, the eye is to be dressed in the same way as after the extraction of a cataract. (See *Cataract.*) Previously to the paracentesis, Beer has often seen every general and local means perfectly useless, but highly beneficial, as soon as that operation had been practised. Even when the paracentesis fails in bringing about a permanent cure, it may still be resorted to as a palliative with great advantage, and be often beneficially repeated, if care be taken not to make the puncture too large. However, when the blood-vessels are generally varicose, and the constitution very bad, such operation is apt to excite violent inflammation, suppuration, and even sloughing of the organ, attended with imminent danger to the patient's life. (*Beer, vol. cit. p.* 620, 622.)

With regard to the second species of hydrophthalmia or that depending upon a preternatural accumulation of the vitreous humour, Beer states, that, in this case, it is chiefly the posterior part of the eyeball which is enlarged, so that the whole organ acquires a conical shape, in which the cornea very much participates. The latter membrane remains unaltered in regard to its diameter; but it is more convex than natural, and its transparency is perfect. It is observed by Mr. Wardrop, (*on Morbid Anatomy of the Eye, Vol.* 2, *p.* 126,) that an increase in the quantity of the vitreous humour happens not unfrequently in staphyloma, in which disease, he says, the enlargement of the eyeball will generally be found to arise more from an increase in the quantity of the vitreous than of the aqueous humour, and he then expresses his belief, that the case, adduced by Scarpa to illustrate the pathology of hydrophthalmia, and cited in the ensuing part of this article, was an example of staphyloma. Be this as it may, one character constant in staphyloma, is often absent in hydrophthalmia; I mean opacity of the cornea. In the case, which consists in an immoderate collection of the aqueous humour, the anterior chamber is always enlarged: on the contrary, in the present form of the disease, that cavity is manifestly lessened, for the motionless iris is gradually forced so much towards the cornea, that at length the chamber in question almost completely disappears. However, the colour of the iris undergoes no change, and the pupil is always rather diminutive. Around the cornea, the sclerotica is rendered bluish by distention, with a somewhat smutty tinge. In the early stage, the patient is affected with shortsightedness, *myopia;* but his power of vision is always seriously diminished, and, at last, is so totally destroyed, that not a ray of light can be perceived. The motions of the globe of the eye and eyelids are lessened or impeded at a still earlier period than in the first species of hydrophthalmia, and to the touch the organ seems like an egg-shaped stone. The very commencement of the disease is attended with pain, which daily becomes more and more severe, and, at length, is not confined to the eye and its vicinity, but affects all the side of the head, the teeth, and neck, being sometimes so violent as almost to bereave the patient of his senses, who urgently begs the surgeon to puncture the eye, or even is driven by desperation to do it himself, as Beer once knew happen. Even while the pain is less afflicting, the patient is deprived of his sleep and appetite. (*Beer, vol. cit. p.* 623.) Though an increase in the quantity of the vitreous or aqueous humour has generally been treated of as a distinct disease, and denominated hydrophthalmia, Mr. Wardrop has never seen a dropsy of the eye without an accompanying disease of the sclerotic coat, or cornea. (*On the Morbid Anatomy of the Eye, Vol* 2, *p.* 126.) Beer offers no valuable remark on the causes of the preceding form of hydrophthalmia, his account of the connexion with scrofula and syphilis being mere conjecture, though delivered as a positive matter of fact. However, another position offered in the paragraph, concerning the prognosis, seems more correct: viz. that as the disease is almost always conjoined with an unhealthy constitution, there can be scarcely any hope of a radical cure. Beer's opinion also is, that, when the disease has made such progress that not a ray can be discerned, and the pain in the eye and head is so violent, by day and night, that the sleep, appetite, and even the senses are lost; it is fortunate if only the most perilous symptoms can be obviated by palliative treatment; for the preservation of a good-shaped eye is, then quite out of the question. And even in the most favourable cases, the utmost which can be expected, is to stop the further advance of the disease, a perfect cure being extremely rare.

According to Beer, the first indication is to improve the state of the health by medicines and regimen; for, unless this object be effected, no expectation of curing the dropsical affection of the eye can be entertained. For this purpose a long time will be requisite, and as for local treatment in this case, little or nothing can be accomplished by it. Hence, the disease often continues to grow worse and worse, and, when the pain becomes violent, the best thing which the surgeon can do, both with the view to the functions of the organ and its form, is to let out the aqueous humour. But Beer reprobates, in the strongest terms, the plan sometimes recommended of plunging a trocar through the sclerotica into the vitreous humour, and keeping the tube introduced until a certain quantity of that humour is discharged. According to Beer's experience, the usual result of such practice is a carcinomatous disease of the eye, terminating in death, which the removal of the part will not prevent. The method preferred by Beer is that which is mentioned by Richter, (*Anfangsgr. B.* 3, *p.* 400,) and consists in opening the cornea and capsule of the lens, as in the extraction of the cataract, discharging the lens and vitreous humour, and letting the coats of the eye collapse; but, in order to prevent any reaccumulation of fluid, he afterward cuts away a little bit of the flap of the cornea. The eye is then to be dressed in the same manner, as after the extraction of the cataract. (See *Cataract.*) The third species of hydrophthalmia, or that produced by an accumulation both of the aqueous and vitreous humours together, is excellently described by Scarpa. He observes, that in every case on which he has performed the operation, and in other examinations of the different stages of the disease, made on the dead subject, he has constantly found the vitreous humour more or less altered in its organization, liquefied, and converted into water, according as the disease was ancient or recent. In some instances he could not distinguish whether the increased quantity of the vitreous, or aqueous humour, had most share in the formation of the disease.

Scarpa also dissected a dropsical eye, taken from the body of a child three years and a half old, who died of marasmus. The vitreous humour was not only wanting in this eye, and the cavity destined for its reception filled with water, but the vitreous tunic was converted into a subtance, partly of a spongy, partly of a fatty nature. This dropsical eye was one-third larger than natural. The sclerotica was not thinner than that of the other eye; but, in consequence of being yielding, flaccid, and separated from the choroides, it had lost its plumpness, and globular shape. The cornea formed a disk, one-third larger than that of this membrane in a sound state; it did not retain its natural pulpy structure, and was obviously thinner than the cornea of the healthy eye. There was a considerable quantity of an aqueous, reddish fluid, between the cornea and iris. The crystalline lens, with its opaque capsule, had been pushed forward a little way into the anterior chamber, but could not advance further on account of a firm adhesion which the capsule had contracted with the iris around the edge of the pupil. As soon as the capsule was opened, the lens issued from it half dissolved, the rest exceedingly soft. It was impossible to detach the whole of the posterior layer of the capsule from a hard substance, which seemed to be the altered membrane of the vitreous humour. Scarpa, therefore, slit open the choroides, from the ciliary ligament to the bottom of the eye, when a considerable quantity of a reddish aqueous fluid gushed out, without, however, one particle of the vitreous humour. In lieu of the latter body, there was found a small cylinder of a substance, partly of a fungous, partly of a fatty nature, surrounded with a good deal of water, which was effused in the longitudinal axis of the eye, from the entrance of the optic nerve, as far as the ciliary ligament, or that hard substance to which the posterior layer of the capsule firmly adhered. This little cylinder was covered for the extent of two lines and a half forwards from the entrance of the optic nerve, by a stratum of whitish matter, reflected on itself, like the epiploon, when raised towards the fundus of the stomach. Scarpa conceived that this stratum of whitish matter was the relics of the unorganized retina; for, on pouring rectified spirits of wine on the whole inner surface of the choroides, and the little cylindrical body, he found no vestiges of the retina on this membrane, and that the whitish substance, which was reflected on itself, became very firm, just as the retina does when immersed in spirits of wine. Both the cylinder and the indurated substance, occupying the place of the ciliary body, were manifestly only the membrane of the vitreous humour, destitute of water, and converted, as was described, into a substance partly of a spongy, partly of an adipose nature. It is not easy to determine whether this altered state of the vitreous tunic had preceded, or was a consequence of the dropsy of the eye. However, it may be this fact, in conjunction with several other similar ones, that Scarpa has met with, in which he found no vitreous humour in the posterior cavity of the eye, but only water, or a bloody lymph, tends very much to establish the fact, that this disease principally consists of a morbific secretion of the vitreous humour, and occasionally, also, of a strange degeneration of the alveolary membrane, by which this humour is formed. Scarpa refers to a similar case. (See *Med. Obs. and Inquiries, Vol.* 3, *art.* 14.)

The augmentation in the secretion of the aqueous fluid, both in the cells of the vitreous humour and out of them, after they have been ruptured from excessive distention, together with a debilitated action of the absorbent system of the eye affected; Scarpa regards as the probable cause of the morbific accumulation of humours in the eye. From such a lodgment, and successive increase of the vitreous and aqueous humours, the eyeball at first necessarily assumes an oval shape, ending at the point of the cornea; the organ enlarges in all dimensions; and in the end, it projects from the orbit in such a manner that it cannot be covered by the eyelids, disfiguring the patient's face as much as if an ox's eye were placed in the orbit.

This disease (says Scarpa) is sometimes preceded by blows on the eye, or adjoining temple; sometimes by an obstinate internal ophthalmy. In other instances it is preceded by no inconvenience, except an uneasy sensation of tumefaction and distention in the orbit, a difficulty of moving the eyeball, and a considerable impairment of sight. Lastly, it is sometimes preceded by none of these causes, or no other obvious one whatever, especially when the complaint occurs in children of very tender age, from whom no information can be obtained. As soon as the eye has assumed an oval form, and the anterior chamber has become preternaturally capacious, the iris seems situated further backward than usual, and tremulates in a very singular way on the slightest motion of the eyeball. The pupil remains dilated in every degree of light, while the crystalline is sometimes brownish from the very beginning of the disease; and sometimes it does not become cloudy till the affection has arrived at its highest pitch. The complaint then becomes stationary; and as the crystalline is not deeply opaque, the patient can distinguish light from darkness, and, in some degree, the contour of objects, and brilliant colours. But when the eye has acquired a larger volume, and the whole crystalline has become opaque, the retina at last remains in a state of complete paralysis.

In the last stage of the disease, to which the term bupthalmos, or ox-eye, is properly applicable, when the dropsical eye projects from the orbit, so as not to admit of being covered by the eyelids with the inconveniences already enumerated, says Scarpa, others associate themselves, arising from the friction of the ciliæ, the secretion of gum, the flux of tears, the ulceration of the lower eyelid, on which the eye rests, and the excoriation of the eye itself. Hence the dropsical eye is gradually attacked with violent ophthalmies, attended with intolerable pains in the part affected, and the whole head. The ulceration, also, does not always confine itself within certain limits; but continues to spread, first depriving the cornea of its transparency, next consuming the sclerotica, and lastly, destroying progressively the other component parts of the eyeball.

At the first appearance of dropsy of the eye, many surgeons recommend mercurials, the extract of cicuta, and of pulsatilla nigricans; and astringent and corroborant collyria, a seton in the nape of the neck, and compression of the projecting eye. However, Scarpa has never yet met with a single well-detailed history of a dropsy of the eye, cured by means of the above-mentioned internal medicines. With regard to externals he has learnt, from his own experience, that when the disorder is manifest, astringent and corroborant collyria, as well as compression of the protuberant eye, are highly prejudicial. In such circumstances, making a seton in the nape of the neck, frequently bathing the eye in a lotion of mallows, and applying to it a poultice composed of the same plant, have enabled him to calm, for a time, that disagreeable sense of distention in the orbit, and over the forehead and temple of the same side, of which patients in this state make so much complaint, especially when they are affected with a recurrence of ophthalmy. But as soon as the eyeball begins to protrude from the orbit, and project beyond the eyelids, he thinks there is no means of opposing the very grievous dangers which the dropsy of the eye threatens, except an operation which consists in evacuating, by an incision, the superabundant humours, then exciting gentle inflammation of the membranes, and suppuration within this organ, so as to make it contract, and shrink into the bottom of the orbit. To defer the operation any longer, would be abandoning the patient to the constant inconvenience of an habitual ophthalmy, the danger of an ulceration of the eye-ball and subjacent eyelid, and what is worse, of carcinoma of the whole eye, with great peril to the patient.

Beer's prognosis in the third species of hydrophthalmia is at least as discouraging as that made by Scarpa; for the rapidity of the disease is said to be such as leaves scarcely a possibility of benefit being effected by any mode of treatment, and the case usually terminates in a carcinomatous exophthalmia, and death. These melancholy events are said, by Beer, to be accelerated by paracentesis of the eye, however executed; and he thinks that the sole chance of stopping the progress of the disease depends upon an endeavour being made in its very commencement to improve the general health, though he owns that success is to be regarded as a very rare and fortunate occurrence. The same author has no faith in any local treatment, and, when the disease is advanced, he considers the extirpation of the eye the only rational expedient, though very precarious in its result. (*Lehre von den Augenkr. B.* 2, *p.* 628, 629.)

The main point, on which Scarpa differs from Beer, is that respecting the effects of discharging the humours of the eye; a practice, which the former represents as useful, even in cases where the hydrophthalmia combines an accumulation both of the aqueous and vitreous humours. In former times, says Scarpa, paracentesis of the eye-ball was greatly extolled. Nuck, one of the promoters of this operation, punctured the eye with a trocar, exactly in the centre of the cornea. (*De Duct. Ocul. Aquos, p.* 120.) It has since been thought better to puncture the sclerotica about two lines from the junction of this membrane with the cornea, that such a small quantity of the vitreous humour may be more easily discharged at the same time with the aqueous, as may be deemed adequate to effect a diminution in the morbific enlargement of the eye-ball.

According to Scarpa, paracentesis of the eye, done so as merely to discharge the humours, can never be a means of curing dropsy of the eye, unless the puncture, made with the trocar, excite inflammation and suppuration, and afterward a concretion of the membranes composing the eye-ball. Indeed Nuck relates, that in a young man at Breda, he was obliged to puncture the eye five several times; that, on the fifth time of doing this, it was necessary to suck through the cannular of the trocar, in order to evacuate the greatest possible quantity of the vitreous humour; and lastly, that it seemed proper to introduce a plate of lead between the eyelids and eye-ball, for the purpose of making continual pressure on the eye, in its empty shrivelled state. In a woman at the Hague, he twice punctured the eye in vain; and she submitted, two or three times afterward, to the same operation, but with what degree of success is not specified. Scarpa has no difficulty in believing, that a radical cure of the dropsy has sometimes been accomplished by means of the puncture, after the trocar, and other similar hard substances, have been repeatedly introduced into the eye, through the cannula of that instrument; but this success can never be attributed to the mere evacuation of the superabundance of the vitreous and aqueous humour; though it may be referred to that circumstance, conjoined with the irritation produced by the cannula, or the tents with which Mauchart kept open the wound.

Scarpa condemns the plan of making a circular incision through the sclerotica, as disadvantageous, and even dangerous. In fact, this circular recision, is constantly followed by the most aggravated symptoms, particularly frequent hemorrhages, an accumulation of grumous blood at the bottom of the eye-ball, vehement inflammation of the eye, eyelids, and head, obstinate vomitings, convulsions, delirium, and the most imminent danger to the patient's life. Such modern surgeons, as have faithfully published the results of their practice on this point, among whom, after M. Louis, (*Mém. de l'Acad. de Chir. T.* 13, *p.* 289, 290;) Marchan, (*Journal de Méd. de Paris, Janvier,* 1770; *Sur deux Exophthalmies, ou grosseurs contre nature du Globe de l'Œil*;) and Terras, (*Ibidem, Mars,* 1776; *Sur l'Hydrophthalmie*,) having ingenuously declared that, after performing the circular recision of dropsical eyes in the sclerotica, they had the greatest motives for repenting of what they had done. Scarpa prefers making a circular section, about three lines in breadth, at the summit or centre of the cornea of the dropsical eye, as directed by Celsus, in cases of staphyloma.

Whether the cornea be transparent or not, as sight is irrevocably lost, the surgeon must introduce a small bistoury across the apex, or middle of the cornea, at one line and a half from its central point; and then by pushing the instrument from one towards the other canthus of the eye, he will cut the lower part of the cornea in a semicircular manner. The segment of the cornea being next elevated with the forceps, the operator is to turn the edge of the knife upward, and complete the work by a circular removal of as much of the centre of the cornea as is equal to three lines in diameter. Through this circular opening, made in the centre of the cornea, the surgeon may, by means of gentle pressure, discharge as much of the superabundant humours in the eye, as is requisite to make the eye-ball diminish, and return into the orbit, so as to be covered by the eyelids. As for the rest of the humour lodged in the eye, it will gradually escape of itself through the circular opening in the cornea, without any more pressure being made.

Until the appearance of the inflammation, that is, until the third or fifth day after the operation, the dressings are to consist of the application of a compress of dry lint, supported by a bandage. As soon as the inflammation and tumefaction invade the eye operated on, and the eyelids, the surgeon is to employ such internal remedies as are calculated to moderate the progress of inflammation; and he is to cover the eyelids with a bread and milk poultice, which must be renewed at least once every two hours. It is a very frequent result, both in the staphyloma and dropsy of the eye, that, on the first appearance of inflammation, the eye-ball, on which the operation has been done, augments and protrudes again from the eyelids in the same way as before the operation. In this circumstance, Scarpa directs the projecting part of the eye-ball to be covered with a piece of fine linen, smeared with a liniment of oil and wax, or the yelk of an egg and oleum hyperici; the application of the bread and milk poultice being continued over this other dressing. Scarpa next states, that when the interior of the eye begins to suppurate, the swelling of the eye-lids decreases, and the eye-ball diminishes in size, and returns gradually into the orbit. This state of suppuration may be known by observing, that the dressings are smeared with a viscid lymph, blended with a portion of the humours of the eye, which incessantly issue from the centre of the cornea; and by noticing the appearance of the margin of the recision, which is changed into a circle of a whitish substance, resembling the rind of bacon, which is afterward detached, like a slough, so as to leave a small ulcer, of a very healthy colour. This ulcer, as well as the whole eye-ball, contracts, and becomes entirely cicatrized, leaving every opportunity for the placing of an artificial eye between the eyelids and the stump of the eyeball.

If a mild inflammation and suppuration in the interior of the eye should not take place on the fifth day, Scarpa exposes the eye to the air, or removes a circular portion of the cornea, half a line in breadth, or little more, by means of the forceps and curved scissors. The foregoing practice is certainly preferable to that advised by Richter, who, when the eyesight is lost, and the object is merely to discharge the humours, and let the eye collapse, sometimes makes a crucial division of the cornea, and removes the four flaps or angles, or even cuts away the whole of the anterior part of the eye-ball through the sclerotica. (*Anfangsgr. B.* 3, *p.* 404.) In order to lessen the bulk of the eye, the late Mr. Ford, in one instance, passed a seton through the front of the organ with apparent success. (See *Med. Communications, Vol.* 1.) Consult *Mauchart, De Paracentesi Oculi, Tub.* 1744. *Conradi, Handbuch der Pathol. Anat. p.* 523. *Fieliz, in Hufeland's Journ.* 4 *B. p.* 208. *Flajani, Collezione d'Osservazioni, T.* 1, *Obs.* 43. *Gendron, Mal. des Yeux, T.* 2. *Louis, in Mém. de l'Acad. de Chir. T.* 5, *4to. Marchan in Journ. de Med. T.* 32, *p.* 65. *Terras, op. cit. Vol.* 45, *p.* 239. *Scarpa, Sulle principali Malattie degli Occhi, Cap.* 13. *C. P. Beger, De Hydrophthalmia Haller Disp. Chir.* 1. 575. *A. Sarwey, De Paracentesi Oculi in Hydrophthalmia et Amblyopia Senum; Haller, Disp. Chir.* 1, 587, *Tub.* 1744. *Benedict, de Morbis Humoris Vitrei. Luke, Diss. de Hydropethalmia, Jen.* 1803. *Richter. Anfangsgr. B.* 3, *p.* 392, *&c. Göt.* 1795. *Beer Lehre von den Augenkr. B.* 2, *Wien.* 1817. *J. Wardrop, Essays on the Morbid Anatomy of the Human Eye, Chap.* 18 *and* 40, *Vol.* 2, *8vo. Lond.* 1818. *B. Travers, Synopsis of the Diseases of the Eye, p.* 195, *p.* 200, *&c.* 8*vo. Lond* 1820.

HY'DROPS. (from ὑδωρ, water.) A dropsy, or morbid accumulation of water. For *hydrops articuli*, refer to *Joints, diseases of;* for *hydrops oculi*, see the foregoing article. With regard to *hydrops pectoris, hydrothorax*, or *dropsy of the chest*, as it is altogether a medical case, an account of its symptoms and treatment will hardly be required in this Dictionary. The only concern, which a surgeon has with the disease, is being occasionally required to make an opening for the discharge of the water. (See *Paracentesis Thoracis*.)

HYDROSARCOCELE. (from ὑδωρ, water; σαρξ, flesh; and κηλη, a tumour.) A sarcocele attended with a collection of fluid in the tunica vaginalis.

HYMEN IMPERFORATE. The inconveniences brought on by such a cause, and the mode of relief, are explained in the article *Vagina*.

A continuation of the hymen over a part of the orifice of the meatus urinarius may produce great pain and difficulty in making water, and symptoms, which may give rise to suspicion of there being a stone in the bladder. For a case illustrating the truth of this observation, see *Warner's Cases in Surgery, p.* 276, *Edit.* 4.

HYPOPIUM, or HYPOPYON. (from ὑπο, under; and πυον, pus.)

By hypopium (says Scarpa) I imply with all surgeons, that accumulation of a glutinous, yellowish fluid, like pus, which takes place in the anterior chamber of aqueous humour, and, frequently, also in the posterior one, in consequence of severe, acute ophthalmy, particularly the internal species. Though severe, acute ophthalmy mostly affects particularly the external parts of the eye; yet, it occasionally invades, with equal violence, both the external and internal coats of this organ, especially the choriodes and uvea. If such inflammation be not promptly checked, by chirurgical means, coagulating lymph is extravasated from the highly inflamed choroides and uvea, and gradually, as it is effused into the cavity of the eye, it passes through the pupil, into the chambers of the aqueous humour, and descends to the bottom of the anterior one, so as to fill sometimes one-third, sometimes one-half of this space; and occasionally, to occupy it to such a height, as totally to conceal the iris and pupil.

This viscid matter of hypopium, though commonly called pus, Scarpa regards as coagulating lymph. The symptoms, portending an extravasation of coagulating lymph in the eye, or an hypopium, are the same as those which occur in the highest stage of violent acute ophthalmy: viz. prodigious tumefaction of the eyelids; the same redness and swelling of the conjunctiva, as in chemosis; burning heat and pain in the eye; pains in the eyebrow and nape of the neck; fever, restlessness, aversion to the faintest light, and a contracted state of the pupil.

As soon as the hypopium begins to form, (says Scarpa) a yellowish semi-lunar streak makes its appearance at the bottom of the anterior chamber, and, regularly, as the glutinous fluid is secreted from the inflamed internal membranes of the eye, so as to pass through the pupil, and fall into the aqueous humour, it increases in all dimensions, and gradually obscures the iris, first at its inferior part, next where it forms the pupil, and lastly the whole circumference of this membrane. As long as the inflammatory stage of violent ophthalmy lasts, the hypopium never fails to enlarge; but, immediately this stage ceases, and the ophthalmy enters its second period, or that dependent on local weakness, the quantity of coagulating lymph, forming the hypopium, leaves off increasing, and, from that moment, is disposed to diminish.

This fact sufficiently evinces (continues this eminent Professor) how important it is, in order to check the progress of the hypopium, to employ, with the utmost care, the most effectual means for checking the attack of violent ophthalmy in its first stage. Copious evacuations of blood, both generally and topically, ought to be speedily put in practice; and when chemosis exists, the conjunctiva should be divided; mild aperients given, blisters applied to the nape of the neck, little bags of emollient herbs to the eye, and other measures employed. It will be known that they have fulfilled the indication, by noticing that, some days after the adoption of such treatment, though there may still be redness of the conjunctiva and eyelids, the lancinating pains in the eye abate, the heat considerably diminishes, the fever subsides, quietude and sleep are restored, the motion of the eye becomes free, and, lastly, the collection of viscid matter forming the hypopium, becomes stationary. It is not unfrequent to see, especially among the lower orders of the people, persons affected with the second stage of severe acute ophthalmy, bearing this collection of coagulating lymph, in the chambers of the aqueous humour, with the greatest indifference, and without complaining of any of those symptoms which characterize the acute stage of ophthalmy. It is only at this crisis, or at the termination of the acute stage of violent inflammation of the eye, that the enlargement of the hypopium ceases, and the coagulating lymph begins to be absorbed, provided this salutary operation of nature be not impeded, nor retarded, by any injudicious regimen. However, if Scarpa had also been aware of the great efficacy of mercury, in arresting the effusion of lymph, I can hardly doubt, that he would have modified some of the preceding observations, as well as his practice; a subject to which I shall presently advert again.

Scarpa states, that persons, little versed in the treatment of diseases of the eyes, would fancy that the most expeditious and efficacious mode of curing an hypopium, after it has become stationary in the second stage of severe acute ophthalmy, would be that of opening the cornea at its most depending part, in order to procure a speedy exit for the matter collected in the chambers of the aqueous humour; especially as this was once the common doctrine. But experience shows, that dividing the cornea in such circumstances, is seldom successful, and most frequently gives rise to evils, worse than the hypopium itself, notwithstanding the modification suggested by Richter, (*Obs. Chir. Fasc.* 1, *Chap.* 12,) not to evacuate the whole of the matter at once, nor to promote its discharge by repeated pressure and injections, but to allow it to flow slowly out of itself. The wound made at the lower part of the cornea, for evacuating the matter of the hypopium, small as the incision may be, most commonly reproduces severe acute ophthalmy, and a greater effusion of coagulating lymph into the chambers of the aqueous humour. Besides, after opening the cornea, if the matter of the hypopium were allowed to escape gradually of itself, it would be several days in being completely discharged, on account of its viscidity. During this time, the glutinous lymph would keep the edges of the wound of the cornea dilated, and make them suppurate. Thus, the incision would be converted into an ulcer, through which the aqueous humour would escape, and even a fold of the iris. Opening the cornea, therefore, only converts the hypopium into an ulcer of that membrane, attended with a prolapsus of the iris, and occasionally of the crystalline itself. Nor can any inference be drawn, in favour of making an artificial opening, during the stationary state of an hypopium in the second stage of severe acute ophthalmy, from the matter of the hypopium having sometimes made its way spontaneously through a narrow aperture in the cornea, with a successful result. For, there is a wide difference, between the effects of a spontaneous opening in a natural, or preternatural cavity of the animal body, or of one made with caustic, and the consequences of an opening, made with a cutting instrument. In the two first methods, the subsequent symptoms are constantly milder than in the last. Besides, even in the instance in which a spontaneous discharge of the hypopium takes place through the cornea, an escape of the aqueous humour, and a prolapsus of the iris, not unfrequently ensues; consequently, the spontaneous evacuation of the hypopium cannot justly form a rule for the treatment of the disease. There is only one case, in which dividing the cornea, in order to discharge an hypopium, is not only useful, but indispensable; this is, when there is such an immense quantity of coagulating lymph extravasated in the eye, that the excessive distention, which it produces of all the coats of this organ occasions symptoms so vehement, as not only threaten the entire destruction of the eye, but even endanger the life of the patient. But this particular case cannot serve (says Scarpa) as a model for the treatment of ordinary cases.

The dispersion of the hypopium, by means of absorption, forms the primary indication, at which the surgeon should aim. In order to stop its progress, the most efficacious method is to subdue the first violence of the inflammation, and to shorten its acute stage, by the free employment of antiphlogistic treatment, and the use of mild emollient, topical remedies. And, in conjunction with these means, there can now be no doubt, that the practice of Brüel, published in 1809, as will be mentioned at the close of this article, ought to be followed: I mean, the quick exhibition of the submuriate of mercury, which has been also found at the London Eye Infirmary the most powerful means of checking the effusion of lymph in the eye. (See *Saunders's Work on the Eye, Ed. 2, and a Synopsis of the Diseases of the Eye, by B. Travers, p.* 135.)

If this treatment answer, the incipient collection of coagulating lymph, at the bottom of the anterior chamber of the aqueous humour, not only ceases to augment, but, also, in proportion as the severe ophthalmy disappears, the absorbent system takes up the heterogeneous fluid extravasated in the eye, and the white, or yellow speck, shaped like a crescent, situated at the bottom of the anterior chamber, gradually diminishes, and is at last entirely dispersed. Janin considered an infusion of the flowers of mallows, applied to the eye that is inflamed and affected with this disease, as a specific resolvent in these circumstances, (*Mém. et Obs. sur l'Œil, p.* 405,) but it is now known, that every topical emollient application, provided it be conjoined with such internal antiphlogistic treatment, as is the most proper for repelling the acute stage of the severe ophthalmy, produces quite as good an effect as this infusion. Simple warm water produces the same benefit. "A young girl (says Nannoni) was struck in the eye by an ear of corn. An inflammation was the consequence, which produced a white pus of a semi-lunar shape, apparently behind the cornea, without a possibility of judging whether the matter was actually situated between the laminæ of that membrane, or in the anterior chamber. Hence, I was asked, whether it might not be evacuated by an incision, particularly as the patient complained of great pain in the eye, and eyebrow. She was in the hospital; and in the presence of Dr. Lulli, and several students in surgery, I said that the pain of which the patient complained, was not occasioned by the pus itself, but the cause which produced it. This cause was inflammation, which probably would be increased by making a larger opening for the external air, than what it has to the internal parts, while the external ones remain entire. By fomenting the eye and forehead with warm water, the inflammation subsided, and the pus disappeared. We have so often witnessed the fact subsequently, that we can also extol the simplicity of the treatment." Such, in short, is the successful termination of an hypopium, whenever the disease is properly treated at its commencement, and the acute stage of severe ophthalmy is promptly checked by internal antiphlogistic means, and emollient applications. But, in consequence of the inflammatory period of the severe ophthalmy having resisted, in an uncommon manner, the best means, or because such means have been employed too late, it sometimes happens, that the coagulating lymph, collected in the anterior chamber, is so abundant, even after the acute stage of ophthalmy, that it continues for a long time to cloud the eye, and intercept vision. Scarpa has often seen patients, especially paupers, who from indolence, negligence, or ill treatment, remained a long time after the cessation of the inflammatory stage of ophthalmy, with the anterior chamber almost entirely filled with the glutinous matter of hypopium. When the inflammation had ceased, these unhappy persons wandered about the streets almost quite indifferent, and without complaining of pain, or any other inconvenience, than the difficulty of seeing with the eye affected. In this second stage of the ophthalmy, the resolution of hypopium obviously cannot be accomplished by the same means, nor with equal celerity, as in the first. At this crisis, the great quantity and density of the glutinous matter extravasated, and the atony of the vascular system of the eye, make it necessary to give nature sufficient time to dissipate the thick, tenacious matter, and, at length, to dispose it to be insensibly absorbed with the aqueous humour which is continually undergoing a renovation. Hence it is right, (says Scarpa) to adopt those means, which are best calculated to invigorate the vascular system of the eye, more especially the lymphatics. This requires more or less time, according as the patient is advanced in years, of a relaxed fibre and weak; or a young man of good constitution.

However, according to Scarpa, in the second stage of violent acute ophthalmy, complicated with hypopium, the surgeon should limit his efforts to the removal of e very thing, which may irritate the eye, or be likely to renew the inflammation; and he should only employ such means, as are conducive to the resolution of the second inflammatory stage, depending on relaxation of the conjunctiva and its vessels, and such remedies as tend, at the same time, to invigorate the action of the absorbents. Therefore, in this state he ought first to examine carefully the degree of irritability in the eye affected with the hypopium, by introducing, between the eye and eyelids, a few drops of vitriolic collyrium, containing the mucilage of quince seeds. Should the eye seem too strongly stimulated by this application, it must not be used, and little bags of warm mallows with a few grains of camphor are to be substituted for it. In the intervals, the vapours of the liquor ammon. comp. may be applied, and recourse had again to a blister on the nape of the neck. When the extreme sensibility of the eye is overcome, the zinc collyrium must be used again, afterward strengthened with a few drops of camphorated spirit. Under such treatment, proceeds Scarpa, the surgeon may observe, that, in proportion as the chronic ophthalmy disappears, and the action of the absorbents is re-excited, the tenacious matter of the hypopium divides first into several small masses; then dissolves still further; and, afterward, decreases in quantity: descending towards the inferior segment of the cornea and, finally, vanishing altogether. But Scarpa accurately observes, that the surgeon cannot always expect to be equally successful, whether the disease occur during the first, or second stage of violent acute ophthalmy, if the tenacious lymph, suddenly extravasated in the interior of the eye, prevail in such quantity, as not only to fill, but strongly distend, the two chambers of the aqueous humour, and the cornea in particular. In this state, notwithstanding the most skilful treatment, the unpleasant complication is often followed by another inconvenience, still worse than the hypopium itself; viz. ulceration, opacity, and bursting of the cornea.

The ulceration of the cornea ordinarily takes place with such celerity, that the surgeon seldom has time to prevent it. As soon as an aperture has formed, the excessive abundance of coagulating lymph, contained in the eye, (sometimes named empyema oculi) begins to escape through it, and a degree of relief is experienced. But, this melioration is not of long continuance; for scarcely is the glutinous fluid evacuated, that distended the whole eye, and especially the cornea, when it is followed by a portion of the iris, which glides through the ulcerated aperture, protrudes externally, and constitutes the disease termed prolapsus of the iris. (See *Iris, Prolapsus of.*) But, if in such an emergency, the cornea already ulcerated, opaque, and greatly deranged in its organization, should not immediately burst, the surgeon is then constrained by the violence of the symptoms, depending on the prodigious distention of the eyeball, to make an opening in this membrane, in order to relieve the immense constriction, and even the danger in which life is placed.

Were there the least chance of restoring, in any degree, the transparency of the cornea, and the functions of the organs of vision, after opening the cornea, Scarpa acknowledges that it would certainly be more prudent to make the opening at the lower part of this membrane. But in the case of empyema of the eye, now considered, in which the cornea is universally menaced with ulceration and opacity, and seems ready to slough, there can be no hope of its resuming its transparency at any point, and he therefore deems it the best and most expeditious method of relief to divide its centre with a small bistoury to the extent of a line and a half; and then to raise with a pair of forceps the little flap, and cut it away all round with one stroke of the scissors, so as to let the humours escape without any pressure.

The eye is to be covered with a bread and milk poultice, which is to be renewed every two hours, the use of such general remedies, as are calculated to check the progress of acute inflammation, and to quiet the nervous system, not being omitted. In proportion as the interior of the eye suppurates, the eyeball gradually diminishes, shrinks into the orbit, and at length cicatrizes, leaving things in a favourable state for the application of an artificial eye.

When Scarpa delivers his opinion, that in the above aggravated form of hypopium, there can be no chance of the cornea resuming its transparency at any point, I think his assertion rather imprudent. Nor, admitting its general truth, does it follow as a matter of course, that it is necessary and right to cut away a piece of the centre of the cornea, and absolutely destroy whatever little chance may yet be left of saving the eye. In support of this remark, let me contrast what Mr. Travers has said with the advise of Scarpa. "When the hypopium is so large as to rise towards the pupil, and the ulceration of the cornea is extending, I think its discharge *by section near its margin* adviseable. If not too long delayed, the ulcerative process is checked by it, which would otherwise run into sloughing, and *the cornea recover with only partial opacity and disfigurement.*" (*Synopsis of the Diseases of the Eye, p.* 280.)

Mauchart de Hypopyo. Tubingæ, 1742. *C. P. Leporin, de Hypopyo.* 4to. *Goett.* 1778. *Goeldlin, Diss. de Hypopyo, Erlang.* 1810. *Walther Merkwürdige Heilung eines Eiterauges, &c.* 8vo. *Landshut,* 1819. *I observe, that in Hufeland and Himley's Journal for Octob.* 1809, *p.* 93, *there is an account of the treatment of an hypopium, or case of effused lymph in the chambers of the eye, by exhibiting from* 12 *to* 18 *grains of the submuriate of mercury, in the space of* 12 *hours, and then giving bark, while as an external application the tinct. opii crocat. was employed. Thus we see that the efficacy of mercury in checking the effusion of lymph in the eye, and promoting an absorption, has been known many years in*

Germany. *A. Scarpa Saggio di Osservazioni e d'Esperienze, sulle Principali Malattie degli Occhi; Venezia,* 1802. *Richter Anfangsgründe der Wundarzneykunst, B.* 3. 1795. *J. Wardrop, Essays on the morbid Anatomy of the Human Eye, Chap.* 6. *Edinb.* 1808.

HYSTEROTOMIA. (from *υστερα*, the womb, and *τεμνω*, to cut.) See *Cæsarean Operation.*

I.

IMPERFORATE HYMEN. (See *Vagina.*)

INCARCERATION. This term is usually applied to cases of hernia in the same sense as strangulation. When the viscera are pressed upon either by the opening through which they protrude, or by the parts themselves within the hernial sac, in such a degree, that the course of the intestinal matter to the anus is obstructed, and nausea, sickness, pain, and tension of the swelling and abdomen, &c. are occasioned, the rupture is said to be in a state of incarceration or strangulation.

According to Professor Scarpa, however, an *incarcerated*, and a *strangulated* hernia, do not imply exactly the same thing. In the first case, says he, the course of the intestinal matter is interrupted, without any considerable impairment of the texture, or vitality of the bowel. On the contrary, in the strangulated hernia, besides the obstruction to the course of the fecal matter, there is organic injury of the coats of the intestine, with loss of its vitality. The bowel that is merely incarcerated, resumes its functions immediately it is replaced in the abdomen; while that which is truly strangulated never returns to its natural state. (*Traité des Hernies, p.* 251.)

This distinction, however, is by no means generally adopted.

INCONTINENCE OF URINE. (See *Urine, Incontinence of.*)

INFLAMMATION. (from *inflammo*, to burn.) By the term, *inflammation*, is generally understood the state of a part in which it is painful, hotter, redder, and somewhat more turgid than it naturally is; which topical symptoms, when present in any considerable degree, or when they affect very sensible parts, are attended with fever, or a general disturbance of the system. (*Burns.*)

The susceptibility of the body for inflammation is of two kinds; the one *original*, constituting a part of the animal economy, and beyond the reach of human investigation; the other *acquired* from the influence of climate, habits of life, and state of the mind over the constitution. (*Hunter.*) The first kind of susceptibility being innate, cannot be diminished by art; the second may be lessened by the mere avoidance of the particular causes upon which it depends.

Inflammation may, with great propriety, be divided into *healthy* and *unhealthy.* Of the first, there can only be one kind, though divisible into different stages; of the second, there must be an infinite number of species, according to the peculiarities of different constitutions, and the nature of diseases which are numberless. (*Hunter.*) Another general division is into *common* and *specific* inflammation, the latter term implying, that the affection has some strongly marked particularity about it, rendering it in some degree independent of such circumstances as would control and regulate the progress of common inflammation. Such are *venereal, variolous, vaccine, erysipelatous, gouty,* and *rheumatic* inflammations, &c. Inflammation may also be divided into the *acute* and *chronic.* This division of the subject is one of the most ancient, and seems to have obtained the sanction of all the best surgical writers. Healthy inflammation is invariably quick in its progress, for which reason, it must always rank as an *acute* species of the affection. However, there are numerous inflammations, controlled by a diseased principle, which are quick in their progress, and are, therefore, to be considered as acute. Chronic inflammation, which will be treated of when I come to the subject of *tumours,* is always accompanied with diseased action.

My friend, Mr. James of Exeter, justly impressed with the utility which would result from a good nosological arrangement of inflammation, has lately attempted to supply what must generally be allowed to be a great desideratum. To the division of inflammation into the *acute, subacute,* or *chronic,* he objects, that in many instances, these are merely different stages of the same disease. The arrangement into the *adhesive, suppurative, ulcerative,* or *gangrenous* inflammation, he does not altogether approve, because it is merely founded on the modes in which either different, or in some instances, the same kinds of inflammation terminate. Under the heads of *phlegmonous, erysipelatous,* and *gangrenous* inflammation, he argues, that diseases of the most opposite nature have been indiscriminately brought together. The disposition to terminate in gangrene, he admits, will afford a basis for subdivision, but not for primary separation. Mr. James makes some judicious observations on the arrangement of the kinds of inflammation, according to the elementary tissue in which they occur, as proposed by Dr. Carmichael Smith, Pinel, and Bichat. The tissues in question are five, and the doctrine supposes, that the inflammation of each is essentially different. The first is phlegmonous inflammation, which affects the cellular membrane, including the parenchyma of the several viscera. The second is inflammation of serous membranes. The third, of mucous membranes. The fourth, which is named erysipelatous, is of the skin. And the fifth, termed rheumatic, belongs to fibrous structure. That inflammations differ materially from the circumstance of their affecting one of these elementary tissues, rather than another, Mr. James freely admits: but the following objections appear to him fatal to this system, if they are true. 1. Different kinds of inflammation are liable to occur in the same tissue. 2. The same kind of inflammation is often met with in different tissues. 3. The same inflammation may be transferred from one to another; an argument, however, on which he lays less stress, as being difficult of direct proof. (See *Obs. on the different Species of Inflammation*, p. 3—7, *8vo. Lond.* 1821.) Although difference of structure unquestionably accounts for some of the varieties in the appearance and character of inflammation, it will not sufficiently explain the principal diversities of this affection to be taken as the foundation of a nosological arrangement, not only for the reasons pointed out by Mr. James, but because the common distinctions of inflammation at present in vogue, and some of which at least are obvious and striking, cannot be at all solved by any reference merely to texture. Nor did this theory satisfy Mr. Hunter, who observed, that if it were true, "we should soon be made acquainted with all the different inflammations in the same person at the same time, and even in the same wound. For instance, in an amputation of a leg, where we cut through the skin, cellular membrane, muscle, tendon, periosteum, bone, and marrow, the skin should give us inflammation of its kind, the cellular membrane of its kind; the muscles of theirs, &c. &c. but we find it is the same inflammation in them all. However, though Mr. Hunter did not admit the possibility of referring the different kinds of inflammation to peculiarities of texture, his doctrines assign to this cause considerable influence over every form of the disorder, as will be presently explained.

The mode of reasoning adopted by Mr. James, leads him to propose; 1st. The division of inflammations into two great classes, according to their disposition either to be *limited* by the effusion of organizable coagulable lymph, or to *spread*. 2dly. The orders are established on the principle of the *degree of connexion of the organ with the vital functions of the animal;* another cause, which exerts a predominant influence over the character of the inflammation; acts invariably, and *cæteris paribus*, in the same degree; the constitutional sympathy being in proportion to the danger, the difficulty of resisting that danger, and of repairing the mischief done. 3dly. The genera are founded on the original disposition of inflammations to have particular modes of termination: thus, says Mr. James, in boil and whitlow, it is to suppurate; in carbuncle, to slough; and in mumps to resolve: and this disposition is so strong, that it is very difficult to procure any other termination. It may happen, however, that there shall be more than one mode, in which it (the inflammation) is disposed to terminate, as in either resolution, or suppuration, in sphacelus, or ulceration, &c. (*Op. cit. p.* 13—16.) Mr. James conceives, "that these general principles will perhaps afford a sufficient basis for such an arrangement, as shall be both natural and useful in its application to all kinds of common inflammation; gout, rheumatism, and scrofula having pecularities which require them to be separated." Also with respect to inflammations arising from external injuries, as they are more simple in their nature, may take place in sound constitutions, and are accompanied with disorganizations, which do not exist in other cases, Mr. James considers them as materially different. This author purposely excludes from his classification inflammations of the organs of sense, and of the bones, the peculiarities in their structure and functions rendering them fit subjects for separate description. With respect to Mr. James's nosological table of inflammation, I consider it very ingenious, and well deserving of the attention of the profession: I may say this without at all involving myself in the hypothesis, that the limitation, or spreading of the generality of inflammations, is a circumstance entirely dependent upon their disposition or indisposition to effuse organizable lymph. Mr. Hunter was well acquainted with the frequent usefulness of the adhesive inflammation in setting limits to disease, yet he did not venture to refer the circumscription of every inflammation to this cause, or the spreading of the disorder entirely to its absence. Nor, indeed, does it seem essential to Mr. James's classification, that any canse should be assigned for the disposition of one class of inflammations to be limited, and of another to spread; the two facts themselves being sufficient for the basis of the division.

There is much foundation for believing that healthy inflammation is invariably an homogeneous process, obedient to ordained principles, and, in similar structures, similar situations, and in constitutions of equal strength, uniformly assuming the same features. If experience reveals to us, that *here* it is commonly productive of certain effects, and *there* it ordinarily produces different ones, the same unbounded source of wisdom communicates to the mind a knowledge, that there is some difference in the tone of the constitution, or in the structure or situation of the parts affected, assignable as the cause of this variety. A modern author (*Dr. Smith, in Med. Communications, Vol.* 2.) makes the nature of the exciting cause one principal ground of the specific distinctions in inflammation, and with good reason, when he takes into the account the action of morbid poisons, and the qualities of disease in general.

The doctrine also receives confirmation from what is observed in cases of burns, and chilblains, where the inflammation is unquestionably attended with great peculiarity, requiring different treatment from that of common inflammation in general. But, when the exciting cause is strictly mechanical, its violence and extent may cause differences in the degree and quantity of inflammation; but, with respect to its quality, this must be accounted for by constitution, or other circumstances.

The attentive observation of experience, the only solid basis of all medical, as well as other knowledge, has informed the practitioner, that parts, which from their vicinity to the source of the circulation, enjoy a vigorous circulation of blood through them, undergo inflammation more favourably, and resist disease better than other parts, of similar structure, more remote from the heart. The lower extremities are more prone to inflammation, and disease in general, than parts about the chest; when inflamed, they are longer in getting well; and the circumstance of their being depending parts, which retards the return of blood through the veins, must also increase the backwardness of such parts in any salutary process. (*Hunter.*) Healthy inflammation is of a pale red; when less healthy, it is of a darker colour; but, in every constitution, the inflamed parts will partake more of the healthy red, the nearer they are to the source of the circulation. (*Hunter.*)

Inflammation, when situated in highly organized and very vascular parts, is generally more disposed to take a prosperous course, and is more governable by art, than in parts of an opposite texture. The nearer also such vascular parts are to the heart, the greater will be their tendency to do well in inflammation. (*Hunter.*) Hence, inflammation of the skin, cellular substance, muscles, &c. more frequently ends favourably, than the same affection of bones, tendons, fasciæ, ligaments, &c. It is also more manageable by surgery; for those parts of the body, which are not what anatomists term *vascular*, seem to enjoy only inferior powers of life, and, consequently, when excited in a preternatural degree, frequently mortify.

But, inflammation of vital parts, though they may be exceedingly vascular, cannot go on so favourably, as in other parts of resembling structure, but, of different functions; because, the natural operations of universal health depend so much upon the sound condition of such organs. (*Hunter.*) The truth of this observation is illustrated in cases of gastritis, peripneumony, &c.

All new-formed parts, not originally entering into the fabric of the body, such as tumours, both of the encysted and sarcomatous kinds, excrescences, &c. cannot endure the disturbance of inflammation long, nor in a great degree. The vital powers of such parts are weak, and when irritated by the presence of inflammation, these adventitious substances are sometimes removed by the lymphatics, but more commonly slough. This remark applies also to substances generated as substitutes for the original matter of the body; for instance, granulations and callus. The knowledge of this fact, leads us to a rational principle of cure in the treatment of several surgical diseases. Do we not here perceive the cause, why very large wens are occasionally dispersed by the application of urine, brine, and similar things, which are now in great repute, on this account, with almost every one out of the profession? How many verrucæ, wrongly suspected to originate from a syphilitic cause, are diminished and cured by a course of mercury! It is the stimulus of this mineral upon the whole system, that accomplishes the destruction of these adventitious substances—not its antivenereal quality. Topical stimulants would fulfil the same object, not only with greater expedition, but with no injury to the general health.

Inflammation, *cæteris paribus*, always proceeds more favourably in strong, than in weak constitutions; for, when there is much strength, there is little irritability. In weak constitutions, the operations of inflammation are backward, notwithstanding the part in which it is seated may, comparatively speaking, possess considerable organization, and powers of life. (*Hunter.*)

Healthy inflammation, wherever situated, is always most violent on that side of the point of inflammation, which is next to the external surface of the body. When inflammation attacks the socket of a tooth, it does not take place on the inside of the alveolary process, but towards the cheek. When inflammation attacks the cellular substance, surrounding the rectum, near the anus, the affection usually extends itself to the skin of the buttock, leaving the intestine perfectly sound, though in contact with the inflamed part. (*Hunter.*)

We may observe the influence of this law in the diseases of the lachrymal sac and duct, in those of the frontal sinus and antrum, and particularly in gunshot wounds. Suppose a ball were to pass into the thigh, to within an inch of the opposite side of the limb, we should not find, that inflammation would be excited along the track of the ball, but, on the side next the skin which had not been hurt. If a ball were to pass quite through a limb, and carry into the wound a piece of cloth, which lodged in the middle, equidistant from the two orifices, the skin, immediately over the extraneous body, would inflame, if the passage of the ball were superficial.—(*Hunter.*) Mr. Hunter compared this law with the principle, by which vegetables approach the surface of the earth; but, the solution of it was too arduous even for his strong genius and penetration.

We see three very remarkable effects follow the prevalence of inflammation; viz. adhesions of parts of the body to each other; the formation of pus, or suppuration; and ulceration, a process, in which the lymphatics are more concerned, than the blood-vessels. Hence, Mr. Hunter termed the different stages of inflammation, the *adhesive*, the *suppurative*, and the *ulcerative*.

All parts of the body are not equally liable to each of the preceding consequences. (*Hunter.*)

In the cellular membrane, and in the circumscribed cavities, the adhesive stage takes place more readily than the others; suppuration may be said to follow next in order of frequency; and lastly ulceration. In internal canals, on the inner surfaces of the eyelids, nose, mouth, and trachea. in the air-cells of the lungs, in the œsophagus stomach, intestines, pelvis of the kidney, ureters, bladder, urethra, and in all the ducts and outlets of the organs of secretion, being what are termed *mucous membranes*, the suppurative inflammation comes on more readily, than either the adhesive, or the ulcerative stage. Adhesions, which originate from the slightest degree of inflammation in other situations and structures, can only be produced by a violent kind in the above-mentioned parts. Ulceration is more frequently met with upon mucous surfaces, than adhesions. (*Hunter.*) The cellular membrane appears to be much more susceptible of the adhesive inflammation, than the adipose, and much more readily passes into the suppurative. (*Hunter.*) Thus we see the cellular substance, connecting the muscles together, and the adipose membrane to the muscles, inflaming, suppurating and the matter separating the muscles, from their lateral connexions, and even the fat from the muscles, while the latter substance and the skin are only highly inflamed. (*Hunter.*) But, it must be allowed, that in situations where fat abounds, we very frequently meet with abscesses. This is so much the case, that fat has been accounted a more frequent nidus for collections of matter, than the cellular substance. (*Bromfield.*) Abscesses are particularly liable to form in the neighbourhood of the anus, mamma, &c. With respect to the fat being highly inflamed, however, the expression is not strictly true. Fat has no vessels, principle of life nor action of its own; consequently, we cannot suppose that it can itself either inflame, or suppurate. We know, that it is itself a secretion, and when an abscess forms in it, we understand, that the mode of action in the vessels, naturally destined to deposit fat, has been altered to that adapted to the formation of pus. When therefore the fat is said to be inflamed, it is only meant, that the membranous cells, in which it is contained, and by which it is secreted, are thus affected.

The deeply-situated parts of the body, more especially the vital ones, very readily admit of the adhesive stage of inflammation. The circumstance of deeply-seated parts not so readily taking on the suppurative stage of inflammation, as the superficial ones do, is strikingly illustrated in cases of extraneous bodies, which, if deeply lodged, only produce the adhesive inflammation. By this process, a cyst is formed, in which they lie without much inconvenience, and they may even gradually change their situation, without disturbing the parts, through which they pass. But, no sooner do these same bodies approach the skin, than abscesses immediately arise. (*Hunter.*)

All inflammations, attended with disease, partake of some specific quality, from which simple inflammation is entirely free. When the constitution allows the true adhesive and suppurative stages to occur, it is to be regarded as the most healthy. Were it in an opposite state, we should see the very same irritation excite some other kind of inflammation, such as the erysipelatous, scrofulous, &c. (*Hunter.*)

In specific inflammations, the position, structure, and distance of the part affected from the source of the circulation, as well as from the surface of the body, seem also to have as much influence as in cases of common inflammation. Upon this point, I feel conscious of being a little at variance with what Mr. Hunter has stated; but, the undecided manner in which he expresses himself, not less than the following reflections, encourages me not to desert my own ideas. We see, that venereal eruptions sooner make their appearance upon the chest and face, than upon the extremities. No organized part can be deemed exempt from the attack of common inflammation; many appear to be totally insusceptible of the venereal. We know, that scrofulous diseases of the superior extremities take a more favourable course, require amputation less frequently, and get well oftener than when situated in the inferior limbs. (*Ford.*) The venereal disease makes more rapid advances in the skin and throat, than in the bones and tendons; we often see it producing a specific inflammation, and an enlargement of the superficial parts of the tibia, ulna, clavicle, cranium, &c. while other bones, covered by a considerable quantity of flesh, are very rarely affected. Gouty inflammation is prone to invade the small joints; rheumatic, the large.

SYMPTOMS, NATURE, AND CAUSES OF INFLAMMATION.

Redness, swelling, heat, and pain, the four principal symptoms of phlegmonous inflammation, have been accurately noticed by Celsus: *Notæ vero inflammationis sunt quatuor, rubor et tumor, cum calore et dolore, lib.* 3, *cap.* 10. If we refer to any writer on this interesting part of surgery, we shall find the above symptoms enumerated as characterizing phlegmon. In short: this term is usually applied to a circumscribed tumour, attended with heat, redness, tension, and a throbbing pain. These are the first appearances observed in every case of phlegmon; and when they are slight, and the part affected is of no great extent, they have commonly very little, and sometimes no apparent, influence on the general system. But when they are more considerable, and the inflammation becomes extensive, a full, quick, and generally a hard pulse takes place, and the patient, at the same time, complains of universal heat, thirst, and other symptoms of fever. While the inflamed part becomes red, painful, and swelled, its functions are also impaired. The same degree of inflammation is said to produce more swelling in soft parts, and less in those of a harder structure. (*Burns.*)

Though the redness, swelling, throbbing, tension, and other symptoms of phlegmonous inflammation, are less manifest, when the affection is deeply situated, yet their existence is undoubted. When persons die of peripneumony, or inflammation of the lungs, the air-cells of these organs are found crowded with a larger number of turgid blood-vessels than in the healthy state, and of course the parts must appear preternaturally red. Coagulating lymph, and even blood, are extravasated in the substance of these viscera, which become heavier, and feel more solid. (*Baillie.*)

The extravasation of coagulating lymph, which is one of the chief causes of the swelling, is also one of the most characteristic signs of phlegmonous inflammation.

Some writers (*Smith, in Med. Commun. Vol. 2.*) have confined the seat of phlegmon to the cellular membrane; but this idea is erroneous. Had such authors duly discriminated the nature of common inflammation, they would have allowed that this affection existed, wherever the capillaries appeared to be more numerous and enlarged than in the natural state, accompanied with an effusion of coagulating lymph, whether upon the surface of a membrane, or a bone, or into the interstices of the cellular substance, and attended with acute pain, and a throbbing pulsation in the part.

As Dr. Thomson has observed, the epithet *remote*, as applied to the *causes of inflammation*, does not appear to be happily chosen; for under this term are comprehended all those agents, events, and states, which contribute immediately, as well as remotely, directly as well as indirectly, to the production of the affection. (*Lectures on Inflammation, p.* 50.)

The remote causes of inflammation are infinite in number, but very easy of comprehension, because only divisible into two general classes. The first includes all such agents as operate by their stimulant or chymical qualities; for instance, cantharides, heat, the action of concentrated acids, alkalies, metallic oxides, and metallic salts, acrid vapours, such as ammoniacal gas, the nitrous, sulphureous, muriatic, oxygenated muriatic gases, &c. alcohol, æther, and all acrid vegetable essential oils, animal poisons, and the whole of that class of substances known by the name of rubefacients. (*Thomson on Inflammation, p.* 55.) The second class of causes are those which act mechanically, such as bruises, wounds, pressure, friction, &c.

Fevers often seem to become the remote causes of local inflammation. In other instances, inflammation appears to arise spontaneously, or, as I should rather say, without any perceptible exciting cause.

The principle on which the application of cold to a part becomes the remote cause of inflammation, is not decidedly known. "No subject (says a distinguished professor) is more deserving of your study, than the effects which are produced in the human body by the operation of cold applied to its surface; but the subject is, at the same time, exceedingly extensive, complicated, and difficult. These effects differ according to the degree in which the cold is applied, the state of the system, the part of the body to which it is applied, and the mode of its application. So diversified, indeed, are these effects, that it requires no mean confidence in theoretical reasoning to believe, that the operation of cold in producing them is explicable upon any single general principle." (See *Thomson on Inflammation, p.* 58.) And in the preceding page, he observes: "The operation of cold upon the human body affords the best example which I can suggest to you, of the production of inflammation from the operation of a power acting upon a part at a distance from that in which the inflammation takes place. The instances formerly mentioned of inflammation of the throat, chest, or belly, from the application of cold to the feet, are daily occurrences in these climates, of which it is impossible for us, in the present state of our knowledge of the animal economy, to give any thing like a satisfactory explanation.

"In some instances, cold, or a diminution of temperature, seems to act more directly upon the parts, with which it comes into contact. We have examples of this in the inflammation of the mucous membranes of the nose, fauces, trachea, and bronchiæ, from the inhalation of cold air; and in the production of rheumatic inflammation from the accidental exposure of some part or other of the body to cold. The application of cold, in the instances I have mentioned, seems to have somewhat of a directly exciting effect; and perhaps the same remark is still more applicable to the local effects of cold in the production of the inflammation accompanying the state, which is usually denominated frost-bite. Touching a solid body, as a piece of metal, the temperature of which has been greatly reduced, produces a sensation like that of burning, and may be followed, like the application of fire, with a blister." (*Op. cit.*)

Numerous opinions have been entertained respecting the *proximate cause of Inflammation*; but almost every theory has been built upon the supposition of there being some kind of obstruction in the inflamed part.

While the circulation of the blood was unknown, and the hypothetical notions of the power of the liver, in preparing and sending forth this fluid, continued to prevail, physicians were so fully persuaded of the existence and influence of different humours and spirits, and so little did they know of the regular and constant motion of the blood, that they believed in the possibility of depositions and congestions of the blood, the bile, or lymph; and acknowledged these as the cause of inflammation. Their anatomists taught them, and their professors of physic supported the opinion, that the liver was the centre of the vascular system from which the blood went forth by day to the extremities, and returned again by night. If then any peccant matter irritated the liver, the blood was sent out more forcibly; and if, at the same time, any part of the body were weakened, or otherwise disposed to receive a greater quantity of fluid than the rest, then a swelling was produced by the flow of humours to this place. Fluxions, or flows of humour to a place, might happen either from weakness of the part which allowed the humours to enter more abundantly, or from the place attracting the humours, in consequence of the application of heat or other agents. The peculiar nature of the swelling was supposed to depend upon the kind of humour. Blood produced the true phlegmon; bile, erysipelas; &c. An idea was also entertained, that the blood and humours might slowly stagnate in a part, from a want of expulsive power, and this affection was termed a *congestion*, while the expression *fluxion* or *defluxion* was used to denote any swelling arising from the sudden flow of humours from a distant part. (*J. Burns, Dissertations on Inflammation.*)

From the theories of *fluxion* and *congestion*, which were quite incompatible with the laws of the circulation of the blood, we turn our attention to the doctrine of *obstruction.*

Boerhaave inculcated, (*Aph.* 375 *et seq.*) that inflammation was caused by an obstruction to the free circulation of the blood in the minute vessels, and this obstruction, he supposed, might be caused by heat, diarrhœa, too copious flow of urine, and sweat, or whatever could dissipate the thinner parts of the blood, and produce a thickness or viscidity of that fluid. When the lentor did not exist before the production of inflammation, he imagined that the larger globules of the blood passed into the small vessels, and thus plugged them up. This circumstance was termed an *error loci*. The obstruction, whether caused by *viscidity* or an *error loci*, was imagined to occasion a resistance to the circulation in the part affected; and hence, an increase of the flow of the blood in the other vessels, an irritation of the heart, and augmentation of the force, or attraction of the blood in that part of the vessel which was behind the obstruction. This caused heat and pain, while the accumulation of blood produces redness. Boerhaave also brought into the account an *acrimonious state of the fluids*, which rendered resolution out of the question, and gangrene likely to follow. (*Aph.* 388.)

The viscidity of the blood cannot be admitted as the proximate cause of inflammation; because we have no proof that this state ever exists; or, granting that it did, it would not explain the phenomena. Were a viscidity to occur it would exist in the whole mass of blood, would affect every part of the body alike, and could not be supposed to produce only a local disorder. How also could such a lentor be produced by causes which bring on inflammation suddenly, without there being time for changes of the fluids to take place?

With regard to the doctrine of *error loci*, or of red globules going into vessels which did not formerly transmit them, the fact must be admitted, at the same time, that the conclusion is denied. When the eye becomes inflamed, the tunica conjunctiva is seen with its vessels full of red blood, which in health is not the case; but this redness never appears until the inflammation has commenced, and must therefore be considered as an effect, not a cause. Nor can this error loci occasion any obstruction in these vessels; for if they be divided, the blood flows freely, which shows that they are large enough to allow an easy circulation. (*J. Burns.*)

Boerhaave's theory of obstruction was too circumscribed, and too mechanical; it reduced all inflammations to one species: the only distinctions which could have arisen, must have proceeded from the nature of the obstruction itself; and it was a doctrine that never could account for the action of many specific diseases and morbid poisons. (*Hunter.*)

As for the supposition of the co-operation of an *acrimony of the fluids*, the proportion of the saline matter of the blood has never been proved to be greater in this, than in any other state of the body. (*Burns.*) Even were a general disorder of this kind to be admitted, no rational explanation of the proximate cause of local inflammation could be deduced from it.

The decided impossibility of giving a rational explanation of the immediate cause of inflammation by any supposed state of the blood alone, led pathologists to investigate how far a change in the blood-vessels themselves might account for the process. It belongs more properly to a physiological than a surgical work, to explain the various facts and experiments in support of the opinion, that the arterial tubes, and especially the capillaries, possess a high degree of vital contractility, whereby the motion of the fluids in them, the process of secretion, and other local phenomena may be importantly affected, in a manner not at all explicable, by reference only to the action and power of the heart. For such information, I would particularly advise the reader to consult the publications of Dr. Wilson Philip, and Dr. Hastings. According to the latter gentleman, the actual agency of the capillary vessels, "is not only supported by such experiments as those related, it is also countenanced by an extensive series of phenomena presented during disease in the human subject. Of these may be mentioned, irregular determinations of blood, the growth of tumours, increased pulsation of arteries leading to inflamed parts, of which the following is a well-marked example, the accuracy of which may be entirely relied upon. The carotids, when the person alluded to is in health, beat equally as to strength and frequency; but when he is attacked with inflammation in the right tonsil, to which he is particularly subject, and which proceeds sometimes so far as nearly to prevent deglutition, each pulsation of the artery gives a throbbing sensation on the right side of the head. On the application of the hand at this time to each carotid, the right is found to beat much stronger and fuller than the left. This diversity of action in these two arteries cannot arise from any impulse given by the blood to the heart: it must be derived from some modification of the contractile power of the artery." And Dr. Hastings expresses his belief in this explanation, notwithstanding Dr. C. H. Parry wishes to attribute to the remote influence of the heart some of the phenomena of local congestion and motion, and to show, that the different states of vascular dilatation are still more conspicuously connected with the different degrees of action of the heart, and the consequent momentum of the blood, than with local circumstances; and that the proneness to local dilatation, or, as it is called, action, is a consequence of slowly succeeding, but continued impulse.

The blood-vessels, through every part of the system, possess a considerable share of irritability, by which they contract, and propel forward their contents. Hence, the blood, by the action of the vessels, receives a new impulse in the most minute tubes, and a well-regulated momentum is preserved in every part of its course. But of all parts of the sanguiferous system, the capillaries seem most eminently endowed with this faculty, and are least indebted to the presiding influence of the heart. Yet even in these vessels, the action of the heart is of high importance in sustaining the healthy circulation, inasmuch as it gives the first impulse to the blood, and preserves the harmony of the sanguiferous system.

The vessels are endowed with this vital property, in order that each organ in the body may receive such a supply of blood as will enable it duly to exercise its functions. Hence, a healthy state of this property is absolutely necessary for the preservation of the animal functions; for, if the vital contraction of the blood-vessels be either increased or diminished, irregular distribution of the blood inevitably follows, and from this source numerous diseases arise, and none more frequently than inflammation. However, though these sentiments, delivered by Dr. Hastings, may be generally correct, I am not prepared to join in the opinion, that inflammation is ever produced simply by an inequality in the distribution of the blood; a statement which this gentleman probably does not mean to make himself, as he confesses that some of the phenomena of this disease depend upon sympathy between the sanguiferous and nervous systems. (See *Hastings on Inflammation of the Mucous Membrane of the Lungs, &c. p.* 32, 64, 65. 8*vo. Lond.* 1820; *and C. H. Parry, Additional Experiments on the Arteries, &c. p.* 112, 114; *Also Whytt on the Motion of the Fluids in the small Vessels; Verschuir de Arteriarum et Venarum vi irritabili; Zimmermann de irritabilitate, p.* 24; *Hunter on the Blood, &c.*)

Dr. Cullen attributed the proximate cause of inflammation to a "spasm of the extreme arteries supporting an increased action in the course of them." This theory only differs from that of Boerhaave in the cause which is assigned for the obstruction. Dr. Cullen conceived, however, that some causes of inequality in the distribution of the blood might throw an unusual quantity of it into particular vessels, to which it must necessarily prove a stimulus; and that, in order to relieve the congestion, the vis medicatrix naturæ increases still more the action of the vessels; which, as in all other febrile diseases, it affects by the formation of a spasm on their extremities." "A spasm of the extreme arteries, supporting an increased action in the course of them, may, therefore be considered as the proximate cause of inflammation; at least, in all cases not arising from direct stimuli applied; and even in this case the stimuli may be supposed to produce a spasm of the extreme vessels" (*Cullen.*)

The inconsistencies in Cullen's theory are very glaring. The congestion or accumulation of blood, which is only an effect or consequence of inflammation, is set down as the cause of the spasm of the vessels to which spasmodic constriction Cullen, strangely enough, assigns the name of proximate cause. The spasmodic contraction of the extremities of the vessels, instead of propelling the accumulated quantity of blood, would render the passage of the blood from the arterial into the venous system still more difficult. (*Burns.*)

We shall now notice the celebrated and very original opinions promulgated on this subject by John Hunter. According to him, inflammation is to be considered only as a disturbed state of parts, which requires a new but salutary mode of action to restore them to that state wherein a natural mode of action alone is necessary. From such a view of the subject, therefore, inflammation in itself is not to be considered as a disease, but as a salutary operation, consequent either to some violence or some disease. Elsewhere the author remarks, the act of inflammation is to be considered as *an increased action of the vessels, which, at first, consists simply in an increase or distention beyond their natural size. This increase seems to depend upon a diminution of the muscular power of the vessels,* at the same time that the elastic power of the artery must be dilated in the same proportion. *This is, therefore, something more than simply a common relaxation:* we must suppose it an action in the parts to produce an increase of size for particular purposes, and this Mr. Hunter would call *an act of dilatation.* The whole is to be considered as a necessary operation of nature. Owing to this dilatation, *there is a greater quantity of blood circulating in the part,* which is according to the common rules of the animal economy; for, whenever a part has more to do than simply to support itself, the blood is there collected in larger quantity. The swelling is produced by an extravasation of coagulable lymph, with some serum: but this lymph differs from the common lymph, in consequence of passing through inflamed vessels. It is this lymph which becomes the uniting medium of inflamed parts; vessels shoot into it; and it has even the power of becoming vascular itself. The pain proceeds from spasm. The redness is produced either by the arteries being more dilated than the veins, or because the blood is not changed in the veins. "As the vessels become larger, and the part becomes more of the colour of blood, it is to be supposed there is more blood in the part; and as the true inflammatory colour is scarlet, or that colour which the blood has when in the arteries, one would from hence conclude either that the arteries were principally dilated, or, at least, if the veins are equally distended, that the blood undergoes no change in such inflammation in its passage from the arteries into the veins, which I think (says Mr. Hunter) most probably the case; and *this may arise from the quickness of its passage through those vessels*." When a part cannot be restored to health, after injury, by inflammation alone, or by adhesion, then suppuration, as a preparatory step to the formation of granulations, and the consequent restoration of the part, takes place. The vessels are nearly in the same state as in inflammation; but they are more quiescent, and have acquired a new mode of action. (*Hunter.*)

With respect to Mr. Hunter's theory, which has deservedly had vast influence in regulating the judgment of professional men in this country, on the nature of the process called inflammation, it cannot be received in the present state of knowledge without some limitation. The hypothesis, that the blood-vessels possess an active power of dilatation, independently of their elasticity, as Dr. Hastings observes, must as yet be regarded as devoid of proof, and therefore should not be assumed as a basis on which any theory of inflammation is founded. (*On Inflammation of the Mucous Membrane of the Lungs, &c. p.* 70.) And, as another intelligent writer remarks, how different would have been Mr. Hunter's inferences, if, instead of trusting to the unassisted eye, he had viewed the inflamed vessels through the microscope. He would then have seen the blood moving, and found, that, "*instead of its passage being quickened in the inflamed vessels, it is uniformly rendered slower in proportion to the degree of inflammation; and, in the most inflamed parts, stands still altogether.*" (*On the Vital Functions, p.* 288, *Ed.* 2.) And in another part of his writings, Dr. Philip has endeavoured to prove, from several facts respecting the colour of the blood, that *within certain limits, the accumulation of this fluid in the debilitated vessels of the inflamed part necessarily causes the blood to retain the florid colour.* (*On Fevers, Part* 2, *Introd.*)

In modern times, the vague, but convenient expression, *increased action of the vessels* has been very generally used as an adequate explanation of the proximate cause of inflammation. The doctrine, it is said, derives support from a review of the several exciting causes of the affection, which, being in general of an irritating nature, must, when applied to any living or sensible parts, occasion such increased action of the vessels; while the method of cure also tends to confirm the opinion. But, before one can judge whether this doctrine is correct, and supported by facts and observation, it is necessary to understand precisely what is implied by increased action of vessels; for it is not every affection of the vessels, capable of being thus denominated, which will of itself constitute inflammation. In gestation, the arteries of the womb are enlarged, and a greater quantity of blood is sent into them; yet this organ is not inflamed. The carotids are in a similar state during the growth of the stag's horn; but no inflammation exists. If then the proximate cause of inflammation is to be called an increased action of the vessels, we must first be informed not only what is meant by the term, but what particular vessels are spoken of, whether the arterial trunks, branches, or capillaries? Because, if the phrase is intended to signify increased alternate expansions and contractions of all the arteries of the inflamed part, it is an hypothesis entirely destitute of foundation. If it be meant to denote an increased velocity of the motion of the blood in the part affected, the doctrine is rather contradicted than confirmed by the latest and most carefully instituted microscopical experiments. But if the expression only refers to the dilated state of the capillaries, the throbbing of the arteries leading to the seat of inflammation, the effusion of lymph, &c. less fault can be found with the language, though yet requiring much further explanation ere it can communicate any very precise information.

"There are (says a learned professor) two hypotheses, which at present divide the opinions of pathologists respecting the state of the capillary vessels affected with inflammation. According to the first of these hypotheses, the inflamed vessels are in a state of increased action; according to the second, they act with less force than the trunks from which they are derived." (See *Thomson on Inflammation, p.* 64.)

The first of these opinions, according to Dr. Thomson, was suggested by the views which Stahl took of the animal economy, and his ideas respecting the tonic or vital action of the capillary vessels. The doctrine, however, was more particularly insisted upon by his disciples and followers, especially Dr. Gorter, who in one place expressly states, "that the proximate cause of inflammation consists in an increased vital action of some particular artery or arteries, by which the blood is propelled with greater force than usual into the communicating lymphatic and colourless vessels." (See *his Compendium Medicinæ* and *Chirurgia Repurgata*)

The doctrine which supposes the action of the inflamed vessels to be diminished, or to be proportionably less than that of the trunk, or trunks from which they are derived, was, as far as Dr. Thomson can learn, first stated by Vacca, an Italian physician, in a small treatise on inflammation, published at Florence in 1765, entitled "*Liber de Inflammationis Morbosæ, quæ in humano corpore fit naturâ, causis, effectibus, et curatione.*"

For an account of the arguments with which Vacca supports his hypothesis, my limits oblige me to refer to the work of Dr. Thomson. (*P.* 68. *&c.*)

As this gentleman has observed, there are certain points in which the two doctrines agree, as well as in which they differ.

"The advocates for each hypothesis agree in admitting, 1st, that inflammation has its seat in the capillary vessels; and 2dly, that the redness in inflammation is owing to an unusual quantity of blood in the vessels of the inflamed part, and consequently that the capillary arteries are much dilated during the state of inflammation. The contractions of these vessels, indeed, it has been said, are increased also in a ratio proportional to the dilatations; but, this is an assertion which has not yet been proved, either in the way of experiment or of observation.

"The sense of throbbing, which the advocates for the hypothesis of increased capillary action regard as the strongest proof of that action, Mr. Allen is disposed to attribute to the difficulty, which the blood meets with in passing from the trunk into the capillary branches. This sensation of throbbing, and appearance of increased action, may be produced in an instant, by applying a ligature to an uninflamed finger, so as to obstruct the motion of the blood through its point. Besides, this throbbing, or pulsatory motion, can afford us no criterion, by which to judge of the force, with which the artery contracts, for, it is produced in the dilatation of the artery, and by a power foreign to the artery itself." (*Thomson on Inflammation, p.* 73.)

Dr. Wilson Philip, many years ago, endeavoured to ascertain, by means of the microscope, the state of the vessels in the various stages of inflammation, both in the *warm* and *cold* blooded animal. I have put the epithet warm in Italics, because it has been very recently observed by my friend Mr. James, that "analogies between the higher and lower orders of animals, the chief subjects of these experiments, cannot be deemed conclusive." (*On some of the General Principles of Inflammation, p.* 29, *8vo. Lond.* 1821) as if it had escaped attention, that many of the experiments were really made on the more perfect animals. From the valuable observations, to which I here allude, (See *Philip on Febrile Diseases, Part* 2, *Introd.*) it appears, that the state of the smaller vessels in an inflamed part is that of preternatural distention and debility. As for the larger vessels, whose state may be ascertained, without the aid of the microscope, "they do not undergo a similar distention, and the increased pulsation of the arteries sufficiently evinces their increased action. In inflammatory affections of the jaw and the head, for example, a greatly increased action of the maxillary and temporal arteries is readily perceived by the finger. It is to be observed, however, that, although inflammation, as was evident from the foregoing experiments, begins in the capillaries, if it continues, the circulation in the smallest vessels becoming very languid, those immediately preceding them in the course of the circulation begin to be distended, and consequently debilitated." Dr. Philip adds, that such distention and debility of the vessels, which immediately precede the capillaries, cannot go far, because when the former lose their power, the circulation in the latter is not supported, and gangrene soon ensues. "*In short,* (says Dr. Philip) *inflammation seems to consist in the debility of the capillaries, followed by an increased action of the larger arteries,*" and is terminated by resolution, when the capillaries are so far excited, and the larger arteries so far weakened, by the preternatural action of the latter, that the power of the capillaries is again in due proportion to the *vis à tergo*.

"Thus far, (says Dr. Philip) I cannot help thinking the nature of inflammation appears sufficiently evident. The motion of the blood is retarded in the capillaries, in consequence of the debility induced in them: an unusual obstacle is thus opposed to its motion in the arteries preceding them in the course of the circulation; which are thus excited to increased action. Several difficulties, however, remain, on which the experiments just related throw no light. Why does a failure of power, of small extent in the capillaries of a vital part, strongly excite, not only the larger arteries of the part affected, but those of the whole system; while a more extensive debility of the capillaries of an external part excites less increased action in the larger arteries of that part, and often none at all in those of the system in general? Why does inflammation often move suddenly from one part to another, when we see no cause, either increasing the action of the capillaries of the inflamed part, or weakening those of the part now affected? Why does inflammation often arise in parts only sympathetically affected, and consequently far removed from the offending cause? Why is inflammation often as apt to spread to neighbouring parts, between which and the part first affected, there is no direct communication of vessels, as to parts in continuation with that part?

"These phenomena, it is evident, (says Dr. Philip) are referrible to the agency of the nervous system, and seem readily explained by the experiments, which prove, that the effects of both stimuli and sedatives, acting through this system, are felt by the vessels, and that independently of the intervention of any effect produced on the heart.

(*Exp.* 27, 28.) Thus, the irritation of the nerves of the inflamed part may excite the larger arteries of this part, or of distant parts, or of the whole sanguiferous system. It will of course be most apt to do so, where the irritation excited by the inflammation is greatest and, consequently in the more important vital parts It cannot appear surprising, that inflammation should suddenly cease in one part and attack another, when we know, that the nerves are capable of exciting to due action the capillaries of the one part, and in the other of impairing the vigour of those, which have not suffered. In the same way, we account for parts only sympathetically affected becoming inflamed, and for inflammation readily spreading to neighbouring parts, which always sympathize, although there is no direct communication between them, either of vessels or nerves." (*On the Vital Functions, p.* 279, *&c. Ed.* 2.)

Respecting the inference, made by Dr. Philip from his experiments, that the circulation is slower in inflamed, than uninflamed arteries, Dr. J. Thompson conceives, that its truth "is not necessary to the establishment of Mr. Allen's hypothesis; and from a number of experiments which I have at different times made upon frogs, I am inclined to believe, *that a diminished velocity of the blood, in the capillary branches, is by no means a necessary, constant, nor even the most common effect of incipient and moderate degrees of inflammation.*" (*P.* 75.)

In order to reconcile this difference in the statements made by the only two writers, who have examined this subject by experiment, Dr. Hastings repeated their mode of investigation with the aid of the microscope. His conclusions are, "that certain stimuli, applied to living parts, produce an increased velocity of the blood's motion, and a contraction of the blood-vessels. During this state of excitement, the part affected is so far from giving any thing, like the appearances of inflammation, that the size of the vessels is diminished, and the part paler. But, if the stimulus be long continued, or increased in power, the small vessels, which in the natural state admit only of one series of globules, become so dilated, as to allow an accumulation of a much less fluid and redder blood in them, which loses its globular appearance, and *moves much more slowly*, than that which previously passed through the vessels. The part now appears inflamed. If the stimulus be removed, the vessels do not soon regain their original state; time is necessary to allow them to recover their contractile power, so as to prevent the impetus, with which the blood is propelled by the heart and larger arteries from keeping up the dilated state of the capillaries. Here then we are obliged to admit, with Boerhaave, that there is an error loci; for, a denser and redder blood passes into small vessels, which before carried much more fluid contents; but the error loci does not cause the inflammation, but results from the previously weakened state of the capillaries. In this manner, the blood may occasionally be extravasated in inflammation, without any actual rupture of a vessel, for the exhalants may be so weakened, and dilated, as to allow globules to pass through them.

"If the stimulus, which produces the inflammation, be of a very acrid nature, debility of the vessels is frequently induced without any previous excitement. The blood in all the smaller vessels becomes very red, circulates very slowly, and in some vessels stagnates.

"The application of a stimulus, different from that which produced inflammation, will sometimes bring on resolution. When this occurs, the dilated vessels contract; they no longer contain a red, dense homogeneous fluid, but again receive blood, consisting of small, nearly colourless globules, which float in a colourless fluid; and the motion of these globules at length becomes as quick as before the inflammation took place. If, however, the inflammation proceed, the blood becomes nearly stagnant; it continues very red, and the vessels are much dilated.

"When this high degree of inflammation is not relieved, sphacelus ensues. The part then feels softer to the finger, and gives way with less force. The vessels are much dilated, the blood does not move, it loses its red colour, and becomes of a yellowish brown hue. The separation of the dead from the living part takes place soon after this change in the colour of the blood.

"While the ulceration, produced by this separation of the dead from the living part of the web is healing, the capillary vessels, distributed on the ulcerated surface, and the contiguous parts, are much distended with arterial red blood, which is moved very slowly. When the ulceration is healed, the vessels become contracted, and circulate the fluid, with the same degree of velocity as before the inflammation was excited.

"With respect to the seat of inflammation, it may be observed, that *the capillaries are first affected*; but even the small arteries of the web are also occasionally distended." (*Hastings on Inflammation of the Mucous Membrane of the Lungs, &c. p.* 90—92.)

With respect to the doctrine, espoused by some pathologists, that the smaller branches of veins are the exclusive seat of inflammation, the same author observes, that the microscope shows us, that the most minute arterial branches, though far less numerous, are equally affected with weakness and distention.

In the course of Dr. Hastings's inquiry, it is proved, that the healthy circulation of the blood essentially depends upon a due degree of action in the vessels throughout the system; that the application of stimuli, while it increases the action of the vessels, produces none of the symptoms of inflammation. When, however, the excessive action of these stimuli has impaired the excitability of the small vessels, the phenomena of inflammation are fully manifested; and when their excitability is restored, the inflammation subsides. It may be logically inferred, therefore, says this writer, that *inflammation consists in a weakened action of the capillaries, by which the equilibrium between the larger and smaller vessels is destroyed, and the latter become distended.* And, with respect to the conclusion, drawn by Dr. Thomson from his experiments, that inflammation, in moderate degrees, consists in an increased action of the vessels, Dr. Hastings argues, that the writer's belief in the excitement of the capillaries, in some cases of inflammation, arises from his having denominated that a state of inflammation, which ought not to be so called. "The application of the salt, (says Dr. Thomson) produced an increased velocity in the dilated larger and smaller arteries and capillary vessels, to which it was more immediately applied. In nine experiments, the phenomena of which I have minutely recorded, the application of the salt was not only followed by a bright red colour, visible to the naked eye, and a sensible enlargement of the arterial and venous branches, but with an increased rapidity of circulation in the capillary vessels; the globules becoming less distinct, than before the application of the salt, and obviously less distinct, from the rapidity of their motion, than the globules in the capillary vessels in the uninflamed part of the web in the same animal. *The repeated application, however, of the salt to the same vessels, was always sooner or later followed by retarded capillary circulation, or even by complete stagnation.*" (See *Thomson's Lectures, p.* 68.) The results of other experiments, made by this gentleman, and which coincide with the sentiments of Dr. W. Philips and Dr. Hastings, need not here be cited.

Now, with regard to those experiments, which seemed to Dr. Thomson to justify the inference, that moderate degrees of inflammation may be attended with an increased velocity of the blood in the inflamed vessels, Dr. Hastings, as I have already said, objects, that the appearances seen, while such velocity of the circulation presented itself in the vessels affected, ought not to have been denominated inflammation; because "it constantly happened in his own experiments, that when inflammation commenced, no globules could be seen even in the blood of the affected vessels. It was universally converted into a bright red homogeneous fluid. So that *globules could never be seen in the capillaries of a really inflamed part, much less moving with great velocity.*" He argues, that the state, alluded to by Dr. Thomson, is only that temporary excitement of the capillaries, generally preceding their debility, which is inseparable from inflammation. (See *Hastings on Inflammation. &c p.* 98, 101.)

Of course, such writers as believe, that the blood in the capillaries is not propelled by these vessels themselves, but by the impulse received from the heart, cannot assent to the foregoing view, in which the proximate cause of the inflammation is ascribed to debility of those vessels. Dr. Parry argues, that the theory, which represents this process as consisting in an increased momentum of the blood in the part affected, is not invalidated, were it even proved, according to the opinion of Dr. Philip, that the velocity of the blood in the vessels of an inflamed part is diminished, unless it be also proved, that the velocity is diminished in a greater proportion, than the quantity is increased. (*Elements of Pathology, Vol.* 1, *p.* 84.) As far, however, as I can judge, the arguments are in favour of Dr. Philip's view of the subject; for, with respect to quantity making up for loss of velocity, if the supposition were to be adopted, surely it could not be retained after the inflammation has arrived at that state, in which the fluid in the capillaries is seen with the microscope to be nearly or quite stagnant. It must be confessed, at the same time, that the question about the proximate cause of inflammation is still a topic of endless controversy, into which I consider it perfectly absurd to enter any further than can be avoided, without having leisure at present to prosecute the inquiry by experiments. In one sense, both Dr. Philip and Dr. Hastings admit, that an increased action of the vessels may exist in inflammation; but then this excitement or increased action is not in the capillaries, but the larger arteries; and Dr. Philip even suggests, that the presence, or absence of such excitement may make the difference between acute and chronic inflammation. The considerations in support of the side of the question, to which I do not myself incline, may be found in the writings of Dr. Parry, Dr. C. H. Parry and Mr. James of Exeter. From this remark, I would not have it inferred, that I am quite convinced of the propriety of referring the proximate cause of inflammation to *debility* of the capillaries, though the retarded circulation in them, like their dilatation, is now a fact placed out of all doubt. The points, however, on which I should not assent to Dr. Philip's doctrine, will be best understood, when the treatment is considered. In the work of Mr. James may be perused a very good summary of Bichat's doctrine, which I would willingly annex, if the subject were intelligible, without an explanation of some physiological opinions, for which I have not room in this edition. (See *J. H. James, Obs. on some of the general Principles, &c. of Inflammation, p.* 38, 8vo. *Lond.* 1821.)

Redness.—This is manifestly owing to the increased quantity of blood in the inflamed part. More blood must necessarily be contained there, because the vessels, which previously conveyed this fluid, are preternaturally distended, and the small vessels, which naturally contained only lymph, are now so enlarged as to be capable of receiving red blood. "I froze (says Mr. Hunter) the ear of a rabbit, and thawed it again; this occasioned a considerable inflammation, an increased heat, and thickening of the part. This rabbit was killed when the ear was in the height of inflammation, and the head being injected, the two ears were removed and dried. The uninflamed ear dried clear, and transparent, the vessels were distinctly seen ramifying through its substance; but, the inflamed ear dried thicker and more opaque, and its arteries were considerably larger."

Many have supposed, that the redness of common inflammation is partly occasioned by the generation of new vessels. This doctrine, however, seems very questionable. When coagulated lymph is extravasated upon the surface of a wound, or an inflamed membrane, unquestionably it often becomes vascular, in other words, furnished with new vessels. But, in the extravasated lymph of a phlegmonous tumour, we have no evidence, that there is any formation of new vessels. Were the lymph to be rendered organized and vascular, the swelling and redness would probably be more permanent, and at least not admit so easily of resolution. When adhesions form between two inflamed surfaces, the organized substance forming the connexion, lives after the subsidence of the inflammation, and is a permanent effect. In the experiments detailed by Dr. Hastings, when the inflammation began and terminated, without any lesion of the part affected, new vessels were never formed. (*On Inflammation, &c. p.* 93.) At the same time, it must be confessed, that great obscurity prevails in this very difficult part of the subject; for when suppuration happens in a phlegmonous tumour, the cavity is lined by a kind of cyst, or membranous layer of lymph, which is unquestionably furnished both with secreting vessels and absorbents; for, otherwise, how could the continued secretion of pus, or its occasional sudden disappearance, be at all explicable. It was probably the enlargement of the small vessels, and the circumstance of their being filled with red blood, that led to the theory of new vessels being usually formed in inflammation. It has, however, been justly observed, that the supposition easily admits of refutation; for heat, and many other causes of inflammation, operate so quickly, that there can be no time for the formation of any new vessels; and, yet the redness is as great, and the inflammation as perfect in a minute as in an hour or a day after the application of the exciting cause. (*Burns*) Mr. Hunter, it is well known, believed, that a coagulum or a layer of lymph might produce vessels within itself.—(*On the Blood, p.* 92, *&c.*) Others, however, distrust this hypothesis, and incline to the opinion, which refers the derivation of vessels for the organization of deposits to parent branches. (*Travers, Synopsis of Diseases of the Eye, p* 113) The latter sentiment is corroborated by the appearances noticed by Dr. Hastings, in his experiments, who describes the small vessels first seen in the lymph, upon the surface of a wound, as even then communicating with the inflamed capillaries. (*On Inflammation, p.* 94.) Another reason assigned for the redness of inflammation, is that the blood after it has become venous, retains, more or less, its bright scarlet colour. (*Hunter.*) And, in some late very carefully conducted experiments, it was remarked, that the weakened action of the smaller vessels was always accompanied with an alteration in the appearance of the blood. In the natural state of this fluid, globules can be distinctly seen; but, after inflammation has commenced, the globular structure disappears, the blood becomes redder, and the most minute capillaries are distended with it. (*Hastings on Inflammation, &c. p.* 95.)

Swelling.—This effect arises from several causes: 1. The increased quantity of blood in the vessels. 2. The effusion of coagulating lymph, and serum, and deposition of new matter. 3. The interruption of absorption, particularly noticed by Soemmering. *De Morb. Vas. Absorb.*

Pain.—This is observed to be the greatest during the diastole of the arteries. The affection is probably owing to the unnatural state of the nerves, and not to mere distention, as many have asserted. Were the latter cause a real one, the pain would always be proportioned to it.

"Parts, which in the sound state have little, or no sensibility (as Dr. Thomson remarks) become exquisitely sensible in the inflamed. That this is the case with tendon, ligament, cartilage, bone, and membrane, seems to be fully established by Dr. Whytt in the very instructive controversy carried on between him and Haller, respecting the sensibility and irritability of the different parts of man and other animals.—(*Lectures on Inflammation, p.* 45.)

Heat.—The heat or real increase of temperature in an inflamed part, when judged of by the thermometer, is generally much less, than might be supposed from the patient's sensations. It is said never to exceed the heat of the blood at the heart. This in health is usually about 100°. Fahrenheit's thermometer; but sometimes in diseases it arises to 106°, or even 107°. Mr. Hunter artificially excited inflammation in the chest of a dog, and in the abdomen, rectum, and vagina of an ass, without being able to discover any obvious rise of temperature, in these parts. In a patient, however, on whom he operated for hydrocele, the thermometer, introduced into the tunica vaginalis, and kept for some time close to the side of the testicle, was only 92°; but rose the following day, when inflammation had come on to 98° 3-4. As Dr Hastings observes, the advocates for excited action of the vessels in an inflamed part have thought, that the increase of temperature favours their hypothesis, and have called to their aid the ingenious calculations of Dr. Crawford. They have even gone so far as to say, what state of the arteries enables the blood to give out most caloric. They tell us, that, in consequence of excitement of the vessels, more blood is transmitted into the minute arteries; the capacity of a greater quantity of this fluid for heat is of course diminished, and more caloric is evolved in the inflamed part. (*Hastings, on Inflammation, p.* 110.) Yet, this theory, besides involving the contradicted hypothesis of an increased and accelerated flow of blood through the vessels of the inflamed part, cannot be reconciled to various other considerations. "Daily experience convinces us, (says the above writer,) that the temperature is not always proportional to the velocity of the circulation. In fevers the author has several times ascertained, with the thermometer, that the heat was 101°, when the pulse beat only 45 times in a minute. In hydrocephalus, with a pulse from 60 to 70, the heat is often above the degree it reaches in health. In these cases, according to the theory of Dr. Crawford, the heat should rather be under, than above, the natural standard." (*Op. cit. p* 112.) And, as another judicious writer has noticed, although the former mode of explaining the production of animal heat has been held adequate to account for the phenomena by such philosophers as Black, Crawford, Lavoisier, and Place, the evidence on which it rests, is not so clear as to have commanded universal assent, or entirely set aside objections. It has indeed been generally allowed, that respiration and the changes it produces in the air and animal fluids, are essential conditions of the evolution of caloric in animals; but, it has been thought, that there are other circumstances, hitherto, perhaps, not well understood, which influence the phenomena. In external appearance, the blood is the same in all the vessels of the fœtus: is this any proof, that its temperature is owing to the conversion of oxygen gas into carbonic acid? Is the uniformity of temperature in the higher animals, under varying states of respiration and circulation, and the consumption of various quantities of oxygen, whether in the same, or different individuals, consistent with the theory? And can local variations of temperature be explained by it? (*Rees's Cyclopædia. art. Respiration.*) Doubts must also spring from the recollection of the discordance of the experiments, related by Dr. Crawford, Dr. John Davy, De la Roche, and Bernard. In fact, the determinations of the specific heats of oxygen gas and carbonic acid by the two latter experimenters are conceived to be very much against the probability of Dr. Crawford's theory. Other stronger grounds for scepticism in this subject are the results of Mr. Brodie's investigations. Having pithed, or decapitated animals, he kept up artificial respiration, and thus maintained their circulation. The blood continued to be changed in the lungs from venous to arterial, and from arterial to venous, in the general circulation. The respective colours of the two kinds of blood could not be distinguished from those, which they exhibit in living and healthy animals. Yet, the temperature of an animal, thus heated, sunk faster, than that of another animal simply killed and left to itself; and the former was supposed to be more quickly cooled by the air conveyed into its chest. Other experiments, detailed by Mr. Brodie, tend to prove, that the oyxgen of the air employed in artificial respiration, underwent its usual conversion into carbonic acid. A living rabbit formed 50, or 60 cubic inches of carbonic acid in an hour. A decapitated animal, in whom artificial respiration was kept up, emitted 40—48 inches in the same time. The thermometer in the rectum of the latter had fallen from 97 to 90, while, in another rabbit left to itself, but similarly treated in all other respects, it had fallen only to 91. In a rabbit, poisoned with woorara, or the essential oil of bitter almonds, not decapitated, and, in which artificial breathing was kept up, 51 cubic inches of carbonic acid were emitted in an hour. The thermometer in the rectum had sunk to 91 in 30 minutes; while it stood at 92 in another animal, treated exactly in the same way, with the omission of the artificial breathing. From these experiments, Mr. Brodie infers "that, in an animal in which the brain has ceased to exercise its functions, although respiration continues to be performed, and the circulation of the blood is kept up to the natural standard, although the usual changes in the sensible qualities of the blood take place in the two capillary systems, and the same quantity of carbonic acid is formed as under ordinary circumstances; no heat is generated, and (in consequence of the cold air thrown into the lungs) the animal cools more rapidly, than one which is actually dead." (See *Phil. Trans. for* 1811, *p.* 36; *and for* 1812, *p.* 378.) It appears certain, therefore, that the generation of animal heat, either in an inflamed, or an uninflamed part, can never be satisfactorily explained by any reference merely to chymical principles, and that the process is essentially connected with and influenced by the state of the functions of the brain and nervous system, and no doubt also by the principle of life itself. At the same time, I think, that any hypothesis, suggested without due reference to the connexion, which respiration has with this curious and interesting process, will never be established. Neither would I venture so far as Dr. Philip, who believes, that animal heat is evolved by the same means, by which the formation of the secreted fluids is effected, viz. the action of nervous influence on the blood, and that the production of such heat is to be regarded as a secretion. (*On the Vital Functions, p.* 169.) However, the influence of the nervous system over this process must be allowed to be very great, and may afford a more probable explanation of the cause of the local change of temperature in inflammation, than Dr. Crawford's theory, combined with the doctrine of increased action, and an accelerated circulation in the vessels of the part affected.

Buffy coat.—The blood, when taken out of the living vessels, spontaneously separates into two distinct parts, the serum and the crassamentum. The last is a compound substance, consisting chiefly of coagulating lymph, and red globules, the most heavy ingredients in the blood. Blood, taken away from persons affected with inflammation, is longer in coagulating, and coagulates more firmly, than in other instances. Hence, the red globules, not being so soon entangled in the lymph, descend by their gravity, more deeply from its surface, which being more or less divested of the red colouring matter, is from its appearance termed the *buffy coat* or *inflammatory crust*. The firmer and more compact coagulation of the lymph compresses out an unusual quantity of serum from it, and the surface of the sizy blood is often formed into a hollow, the edges being drawn inward. (*Hunter.*) In some cases, these changes in the blood are deemed more infallible proof of the existence of inflammation, than the state of the pulse itself. They are however, only a criterion of some unusual operation going on in the system; for, the blood taken from pregnant women is always found to present the same phenomena. In peritonæal inflammation, the patient sometimes seems to be in the most feeble state, and the pulse, abstractedly considered, would rather induce the practitioner to employ tonics, and stimulants, than evacuations; but, should the continuance or exasperation of the disorder, or any other reason, lead him to use the lancet, then the *buffy coat*, and the *concave surface* of the blood, materially obviate any doubt of the existence of inflammation. Surgeons should never forget, however, that in a few anomalous constitutions, the blood, when drawn, always exhibits the above peculiarities.

Terminations.—Inflammation is said to have three different terminations; or, in more correct language, we may say, that, after this process has continued a certain time, it either subsides entirely, induces a disposition in the vessels to form pus, or completely destroys the vitality of the part.

When the inflammation is to end in the first manner, which is the most favourable, the pain becomes less, the swelling subsides, the fever, and every other symptom gradually abate till at last the part is wholly restored to its natural size and colour. There is no formation of pus, nor any permanent injury of structure; and if Dr. Philip's theory of inflammation be correct, the debilitated capillaries are excited to due action by the increased action of the larger arteries. (*On the Vital Functions, p.* 298.) This termination of inflammation is termed by surgeons *resolution*. It is fortunately the most common, as well as the most desirable manner, in which the affection ends.

If, however, notwithstanding the application of the usual remedies, the several symptoms of heat, pain, and redness, instead of diminishing, rather increase; if the febrile symptoms are likewise augmented, and the tumour gradually acquires a larger size, turns soft, somewhat prominent in the middle, or towards its most depending part; if it should next acquire a clear shining appearance, and become less painful, the different symptoms of fever being at the same time diminished, and a fluctuation perceptible in the tumour; the inflammation has ended in *suppuration*.

The worst, but happily, the least frequent consequence of common inflammation, is the death, or *mortification*, of the part affected. In the microscopical experiment of Dr. Hastings, it was observed, that, on the approach of gangrene, the blood entirely loses its red colour, and acquires a yellowish brown tinge. (*On Inflammation, p.* 97.) The part, which was of a bright red, becomes of a livid hue; small vesicles, filled with a thin fetid serum, arise on its surface, and air is plainly felt within the cellular membrane. The pain is indeed diminished; but the pulse sinks, while the tumour is gradually changed into a black, fibrous mass.

These are the three common terminations of inflammation. In books, scirrhus is sometimes enumerated as one of the terminations of inflammation. The best modern surgeons, however, do not regard scirrhus as one of the usual effects of ordinary inflammation; "the term scirrhus, as used by the older medical writers, is extremely indefinite, having been sometimes used to express every kind of induration, which remained after an attack of inflammation, as well as the morbid incipient state of parts about to become affected with cancer. Surgeons now usually limit the use of the term to the last of these significations." (*Thomson on Inflammation, p.* 126.)

Common inflammation, particularly when it affects glandular parts, is often followed by induration, which afterward continues for a greater or lesser time. Thus, when the testis has been inflamed, a hardness of the epididymis frequently remains during life. Such induration, however, is not at all malignant, and, consequently, very different from what is implied by a real scirrhus.

TREATMENT OF INFLAMMATION.

One principal difficulty in believing the fact of the retardation of the circulation in the capillaries of an inflamed part, and against the supposition of their being in a state of debility, is, that the most effectual treatment of common inflammation consists of means, which are generally of a debilitating nature, as bleeding, purging, &c. And surgeons are still further attached to the theory of increased velocity of the blood's motion, in the part affected, by the recollection of the local augmentation of temperature, the throbbing, and the instantaneous return of the red colour, after the discontinuance of any pressure, by which the redness has been momentarily removed at some point of the inflamed surface. These too are all so many facts, which, as far as I can judge, are admitted by the generality of reasoners, whatever may be their particular theory. At the same time, it appears equally well proved by careful microscopical experiments, that in the capillaries of the part, which is directly the seat of inflammation, there is a retardation, and sometimes even a stagnation, of the circulation. But, this is not all, it is further manifested, that the capillaries are considerably dilated, the blood in them materially altered, and that these phenomena are followed by an increased action of the lar ger arteries leading to the part affected. Now, I think, if we remain contented with these obvious circumstances, and dismiss the hypothesis of debility of the capillaries, not only the necessity for venturesome conjectures may be avoided, but a more rational account delivered of the principles of the efficacy of the usual mode of treatment. Thus, I would not presume to offer any supposition, why the capillaries are dilated, and why the motion of the fluid in them is retarded, but would be satisfied with a knowledge of the facts, so as to elude a source of endless controversy, viz. the question, whether these changes proceed from debility of the said vessels, or other causes? In the view, which I take of the nature of phlegmonous inflammation, I consider the following circumstances proved: 1. The dilated state of the capillaries in the immediate seat of inflammation. 2. The retardation, or even stagnation of the circulation in them. 3. The increased action, or excitement of the larger arteries leading to the inflamed part. All these three main points seem to me to be fully established by the investigations and experiments both of Dr. Wilson Philip and Dr. Hastings; and I may make the observation, though aware, that the latter gentleman does not regard increased action of the larger arteries, as a constituent and necessary part of inflammation, because cases occur, in which no such excitement can be detected; (*On Inflammation, p.* 104,) for, I here put out of consideration chronic inflammation, which I believe is entirely a different process, bearing no resemblance to the acute forms of the disorder, either in the state of the capillaries, or of the larger arteries. Assuming the above points as proved, it is to be inquired, whether other facts, such as the heat and throbbing in the inflamed part, the instantaneous return of redness to the spot, which has been touched, and the efficacy of common treatment, are reconcileable with them, or not. I am disposed to think they are; for, it is only asserted, that the passage of the blood is more or less obstructed in the capillaries in the seat of the inflammation; and the larger arteries, leading to them, are, for the most part, obviously in a state of increased action, whereby a greater quantity of blood must be supposed to be determined towards the part. Now, as this augmented quantity of blood cannot pass freely through the smaller vessels, in the immediate place of inflammation, it must be thrown into such arteries in the neighbourhood, as are capable of receiving it, so that, in fact, the theory of obstruction of the capillaries may not be altogether incompatible both with increased action, and quickened circulation, in the arteries directly around the parts, in which there is a retarded circulation in the capillaries. This view of the subject, I think, is not liable to greater perplexity in the explanation of the heat, throbbing, &c. than former doctrines, involving the contracted notion of there being an increased action, and an augmented velocity of the blood's motion, in *all* the arteries of the part affected.

Resolution being the most favourable termination of common inflammation, it is of course the object at which the surgeon generally aims in the treatment. Dr. Philip's very ingenious view of inflammation leads him to suppose that resolution arises from the debilitated capillaries being excited to due action by the increased action of the larger arteries. (*On the Vital Functions, p.* 298.) But, I am of opinion, that the doctrine of debility of the capillaries, and the hypothesis of their being strengthened by the excitement or increased action of the larger vessels, are by no means satisfactory, and perhaps, not very intelligible. On the contrary, if the capillaries are already so weak as to be distended by the ordinary impulse of the blood, how are they to be restored to their natural dimensions and functions by any increased action of the larger arteries? the effect of which I should conceive, would be to gorge them still more with blood, and produce even a greater dilatation of them. Were the above reasoning correct, it would follow, that a principal indication in the treatment would be to promote the increased action of the larger arteries, whereby so much supposed benefit is communicated to the debilitated capillaries. Yet, such practice is contrary to the dictates of experience, and is even inconsistent with the principles, on which Dr. Philip himself thinks the treatment should be founded. Indeed, the following directions are such, as I imagine, will be perfectly approved of by practitioners, who, far from looking upon the increased action of the arteries, as a means of relief, are accustomed to do every thing in their power to lessen and resist it. "All the local means (says Dr. Philip) are calculated either to lessen the contents of the morbidly distended vessels, or to excite these vessels to expel them. The general means are regulated by the effects, produced by the disease on the more distant vessels, through the medium of the nervous system; the objects of this part of the treatment being, neither to allow the action of these vessels to fall so low, that it is incapable of supporting any degree of circulation in the debilitated vessels, nor to become so powerful, as farther *to distend by gorging them with blood. Thus, when the symptoms of active inflammation run high, we lessen the vis à tergo*; when gangrene is threatened, we increase it." (*W. Philip, on the Vital Functions, p.* 285, *Ed.* 2.) In short, as soon as the fact is established, that a strong flow of blood towards an inflamed part tends to aggravate the disorder, all difficulty ceases in reconciling the usual means of relief to that theory of inflammation, which takes into the account a retarded state of the circulation in the distended capillaries.

The means employed for the relief of inflammation have been cursorily noticed in a preceding article. (See *Antiphlogistics.*) We shall now devote a few more pages to a more particular consideration of them.

Removal of exciting causes.—In all cases the first circumstance to be attended to is, the removal of all such exciting causes as may happen to present themselves. If the irritation of a splinter were to excite phlegmonous inflammation, who would not of his own accord directly take away the extraneous body? In wounds, foreign substances frequently excite inflammation, and ought to be taken away as speedily as possible; splintered pieces of bone often give rise to the affection, and require removal; the head of a bone, being out of its place, may press and inflame the part on which it lies; and who does not immediately see the propriety of putting it back into its natural situation? These and other similar exciting causes may often be detected and removed at once, and this is doing a great deal towards the cure and even the prevention of inflammation. However, many of the exciting causes of this affection are only of momentary application; yet, though they no longer exist, the process of inflammation must follow, as a kind of salutary operation, without which, the injured organization, and tone of the parts, still remaining, could not be rectified again. Hence besides taking away the remote cause, whenever this can be done, it is proper to moderate, by other means, the increased action of the larger arteries, and lessen the velocity of the blood's motion towards the inflamed part.

Bleeding.—As there is reason to believe, that, in common inflammation, a greater quantity of blood is impelled towards the inflamed part, than in the natural state, and experience proves, that nothing has a more powerful effect in checking the disorder, than diminishing the determination of blood to the part, bleeding must be a principal means of relieving inflammation: it lessens the action of the whole sanguiferous system, and, of course, of that part of it, which is directly concerned in regulating the quantity of blood transmitted to the part affected. On the principle also of lessening the whole mass of blood in the circulation, it must have a similar effect.

Bleeding, however, is often misemployed, especially when regarded as the only remedy for inflammation, and other steps are neglected. The general obstinacy and vehemence of the process in weak constitutions prove, that bleeding is not invariably proper, and in such individuals it often appears, as if their general irritability and the difficulty of curing the inflammation were in a ratio to their weakness. When inflammation is complicated with disorder of the chylopoietic, blood should be taken away with great circumspection.

A great deal of induration with little pain and heat in the inflamed part; the probability of a long and copious suppuration, as is the case in many compound fractures; and the connexion of the inflammation, with a want of tone in the part; are particular instances, in which the practitioner should be sparing of this evacuation. Bleeding is sometimes quite unnecessary, when the local inflammation and symptomatic fever are trivial, when the patient is feeble or very old, and when the cause of the affection can be entirely removed. (*Richter.*)

On the other hand, bleeding is highly beneficial when the inflammation is uncomplicated with any previously existing disorder of the gastric system, while it is considerable in extent and degree, and attended with a good deal of febrile disturbance. The same practice is also strongly indicated, when the part affected is very sensible, and highly important, in regard to its office in the system. Thus the lancet must be freely employed in acute ophthalmy, or inflammation of the eye, which is a most sensible part; and in inflammation of the lungs, brain, or stomach; organs, the sound state of which is essential to the regular continuance of all the various operations in the animal machine; and if a successful effort be not promptly made to stop such inflammation by the most vigorous means, death itself will be the result.

In general, bleeding may be said to be indicated, when the patient is young, robust, and plethoric; when the cause of the disorder can neither be removed nor diminished; and when there is a very strong motive for wishing to avoid the formation of matter. Inflammation of the eye is a case, illustrative of the truth of the last observation; for, if suppuration take place in this organ, the common consequence is so serious a destruction of its internal structure and organization that the future restoration of sight is totally impossible. In the examples, falling under the conditions specified as requiring blood to be taken away, it is sometimes necessary frequently to repeat the evacuation.

The efficacy of bleeding is greater, the sooner it is practised, and the more suddenly the blood is evacuated. Bleeding near the part affected is usually more effectual, than when done in a remote situation. Hence, in inflammation of the eye, or brain, it is often considered most advantageous to take blood from the temporal artery.

"In many inflammations, particularly those of the parts contained in the three great cavities of the head, chest, and belly, general blood-letting (says a judicious writer) if not the only, is the principal remedy, to which we can trust for a cure. The quantity of blood, which in these inflammations it is necessary to take away, varies according to the violence of the inflammation, the temperament, strength, and habits of the patient, and according to the structure, functions, and situation of the organ in which it occurs. From twelve to twenty ounces, or even more, ought generally to be drawn every time we have occasion to use the lancet in the cure of inflammation, and bleeding to this extent may be repeated two or three times in the course of the first twenty-four hours, according to the effects which it seems to produce, as well as according to the violence and urgency of the symptoms. In inflammation of internal parts, we judge of the effect of bleeding, and of the necessity of a repetition, from the feeling and continuance of pain, from the state of the pulse, and also from the appearance of the blood, which has been last drawn.

"A partial, and in some instances, an almost complete cessation of pain takes place even during the operation of blood-letting. This is always a favourable symptom, and indicates, that the inflammation has made no great, nor very alarming progress. In other instances, the relief from pain, though inconsiderable, at the time of bleeding, becomes afterward more sensible, and the other symptoms of inflammation abate in nearly the same proportion; while, in other instances again, the pain is either not relieved by the bleeding, or, if relieved, the relief is but of short duration. These last are cases, in which the other symptoms of inflammation continuing unabated, recourse must be had again to the use of the lancet, and as much blood drawn, as can be done with safety to the patient.

"The changes, which take place in the state of the pulse, either with regard to its frequency, or strength, during, or soon after the abstraction of blood, though they afford criteria, by which we may judge of the state of the inflammation, and of the effects of the bleeding, are by no means marks so sure of the advantage, which has been obtained, as that derived from the cessation of pain.

"In some inflammations of the head, for example, the pulse is slower than natural, though it beats with its accustomed, or even with an increased degree of strength. In inflammations also of the peritonæum, and of the intestinal canal, we find the pulse not much quicker than natural, small, and contracted. We should deceive ourselves, therefore, were we to infer, that an increase of inflammation had taken place, because, in the first instance, the pulse had become quicker, and in the second, fuller and stronger, during or soon after the abstraction of a quantity of blood.

"The pulse, it may be remarked, has often a contracted, cord-like feel in inflammation, and it may always be regarded as a favourable event, when it becomes softer, fuller, and slower, during or soon after blood-letting." (See *Thomson's Lectures on Inflammation, p.* 166, 168.)

With respect to the buffy coat of the blood, Dr. Thomson states, that it is not by the buffy coat alone, but by the buffy coat, in conjunction with the quantity and firmness of the coagulum, that we must judge of the propriety of any further detraction. When the buffy coat has a firm and tenacious consistence, and when the pain continues unabated, we may conclude, that the inflammation is not subdued. But, when the coagulum is soft and easily broken, and when the colour of the buffy coat is changed from a yellowish to a greenish hue, Dr. Thomson thinks, that little or no benefit can be derived from bleeding. But, as already mentioned, every practitioner should remember, that, in particular constitutions, and in pregnancy, the blood taken away naturally exhibits a buffy appearance, independently of inflammation.

The preceding remarks chiefly relate to *general* bleeding; for, in phlegmonous inflammation, *topical* bleeding is scarcely ever improper. It is always a point highly worthy of the surgeon's consideration, whether bleeding *in* or *near* the part will answer better, than taking the blood from the *general habit;* for, certainly less may be removed in this way, so as to have equal effect upon the part inflamed, and probably, upon every other disease that is relieved by bleeding, with less injury to the constitution. Although, in many cases, the general habit is relieved by bleeding, yet it is the part affected which most requires this evacuation. That local bleeding has very considerable effects on the inflamed part, is proved by the sudden relief which is often produced by the application of leeches in cases of gout. The mere use of leeches, without other measures, will also sometimes remove a tumour in the breast, having all the appearances of a scirrhus, which cannot be considered as inflammatory, so that topical bleeding extends its power further, than the mere checking of inflammation. Some part of its effect has been imputed to sympathy. (*Hunter.*) There are three modes of performing topical bleeding: by cupping; by leeches; and by dividing or scarifying the dilated vessel leading to the inflamed part. (*See Bleeding.*) Upon the head and face, leeches are commonly employed; upon the chest, either leeches or cupping; upon the abdomen, leeches; and upon the joints, either cupping or leeches. When the eye is inflamed, leeches may either be applied to the adjoining temple; or the dilated vessels of the conjunctiva may be scarified; or both methods may be adopted. When the inflammation extends quite to the surface of the body, leeches are always most eligible, as their bites cause less irritation in inflamed parts, than the punctures of the scarificator, or the pressure of cupping glasses.

Purging. The exhibition of mild laxative medicines, and saline purgatives, is a principal means of diminishing inflammation. Purging does not produce such lasting weakness as is the consequence of bleeding, and, therefore, it is scarcely ever omitted, even when the abstraction of blood is deemed improper. Saline purges must lessen the quantity of circulating blood, inasmuch as they increase the secretion from the intestinal arteries; and therefore, they probably operate beneficially in the cure of local inflammation, much upon the same principle as bleeding. Mr. Hunter was of opinion, that purging lowers action, without diminishing strength, by which we are probably to understand, without producing a very lasting or permanent loss of strength. With respect to mild laxative medicines, none are superior to manna, rhubarb, oleum ricini, and the like; and of the saline purgatives, the best are, the sulphate of soda, tartrate of potass, phosphate of soda, and sulphate of magnesia. It may here be remarked, that, besides the benefit, which the local inflammation derives from the judicious administration of purgatives, the costiveness and heat, which usually attend the symptomatic fever, are also removed by the same means.

"Purgatives (says Dr. Thomson) are more or less required in almost every species of inflammation; but they are more peculiarly necessary in those, which are accompanied with a high degree of fever, or with derangement of the digestive, or biliary organs. In cases of inflammation which have a tendency to spontaneous resolution, they are almost always the best, and often the only remedies that are required." (*Lectures on Inflammation, p.* 171.)

Considering the general approbation of the employment of mild saline purgatives in cases of inflammation, I confess that I was not a little surprised to find merely the following short unfavourable notice taken of them by a celebrated foreign professor, in his account of the treatment of inflammation. "As for purgatives, they must be used with discretion. There are none of them antiphlogistic, as has been pretended. They always produce more or less irritation, and can only be applicable, when the cause of the inflammation is in the intestinal canal. In the beginning of the complaint we ought, therefore, in general to abstain from them, and confine ourselves to emollient clysters" (*Boyer, Traité des Maladies Chirurgicales, T.* 1, *p.* 39.)

Diaphoretic and nauseating Medicines.

Medicines, which have the power of producing sickness, lessen, for a time, the action, and even the general powers of life. This is in consequence of every part of the body sympathizing with the stomach; and the effect may be very quickly excited. Sickness lowers the pulse, makes the small vessels contract, and rather disposes the skin to perspiration. But, nothing more than nausea should be caused; for vomiting rather rouses than depresses. (*Hunter.*) Nauseating medicines employed after bleeding has been practised once or twice, are often productive of considerable benefit; but there are some affections, in which they cannot be used, such as inflammation of the stomach and intestines. In all superficial inflammations, however, they may be safely and advantageously exhibited, as well as in most inflammatory affections internally situated. In inflammation of the dura mater and brain, and, indeed, in every instance, in which there is an urgent reason for putting as sudden a check as possible to the continuance of the affection, the employment of nauseating doses of antimony is most strongly indicated. The tartrite of antimony (emetic tartar) is the medicine, on which practitioners place the greatest reliance, and it is to be prescribed for the purpose of exciting nausea, as follows:—℞. Antimonii tartarisati grana duo; Aquæ distillatæ uncias quatuor. Misce et cola. Dosis, Uncia dimidia sextâ quâque horâ.

The safest diaphoretics are citrate of potass, acetate of ammonia, and tartrite of antimony, and James's powder. The two latter, from their effects in producing nausea, and weakening the pulse, are sometimes most efficacious, as already stated.

"The warm bath seems to act (as a modern writer says) not only by increasing the tendency to perspiration, but also by occasioning a determination of blood to those parts of the body to which it is more immediately applied. It is in this way that bathing the feet seems to relieve inflammatory affections of the head and throat. I have not seen any experiments, nor am I acquainted with any, which have been made with a view to ascertain its use in the inflammations of the chest; but, in all inflammations of the belly, and of the viscera contained within that cavity, there are no other means of cure, blood-letting excepted, which afford such sudden and permanent relief as that which is obtained from hot fomentations and warm bathing." (See *Thomson on Inflammation, p.* 173.)

Opium. The majority of surgeons entertain an insuperable objection to the administration of opiates in almost all cases of inflammation, and the aversion to this practice is for the most part deducible from the recollection of opium being a powerful stimulant. The plan, however, has its advocates. (*B. Bell*; *Richter, &c.*) One of its strongest partisans tells us, that opium particularly lessens the disturbance of inflammation, and allays pain, which is at once a principal symptom of the process, and a cause of its augmentation, as well as that of the fever. Opium also quiets the inordinate action of the solids, the mental agitation and restlessness so powerfully, that it well deserves the name of the grand *antiphlogistic remedy.* It likewise occasions a moisture on the surface of the body, which experience shows is eminently serviceable in all inflammations affecting the skin. When given with this view, it is usually conjoined with antimony, camphor, calomel, or ipecacuanha. The administration of opium is a general practice in all painful inflammations arising from external causes, and *it is attended with perfect safety when evacuations from the bowels and bleeding have been previously put in practice.* Care must be taken to give it in sufficient doses; for small quantities not only fail in fulfilling the object, but frequently produce quite an opposite effect. During its employment, the bowels should be kept open with glysters. The efficacy of opium chiefly manifests itself in the early stage of the affection; for, as soon as the inflammatory fever has extended itself to the whole system, it loses its beneficial virtues. Hence, in cases of external injuries, it is to be given the two first days, immediately after bleeding. It is to be given as soon after the accident as possible, in order to tranquillize the mental alarm, and, if convenient, towards the evening, for the sake of procuring a quiet night. (*Richter.*) Evacuations being premised, says the other advocate for this medicine, the next object of importance is to procure ease and quietness to the patient, which, in cases of inflammation, are often of more real service, than any other circumstance whatever. The most effectual remedy for this purpose is opium, which, when the pain and irritation are considerable, as very frequently happens in extensive inflammations, should never be omitted. In large wounds, especially after amputations, and other capital operations, and in punctures of all kinds, large doses of opium are always attended with remarkably good effects. In all such cases, however, opium, in order to have a proper influence, should be administered in very large doses; otherwise, instead of proving serviceable, it seems rather to have the contrary effect. This circumstance is, perhaps, the chief reason why opiates in general have been very unjustly condemned in every case of inflammation. (*B. Bell.*)

On the contrary, those who are averse to the use of opium, remark, that in acute inflammation daily experience shows, independently of every theory, that the exhibition of this medicine increases the general fever, and aggravates the local action. Even given as a preventive of inflammation, after operations, anodynes are almost uniformly hurtful, producing restlessness, heat, thirst, and afterward headach, sickness, and frequently troublesome vomiting. (*Burns.*)

According to Dr. Thomson, "those diaphoretics, into the composition of which opium enters, seem to be better adapted for inflammation attended with fever of a typhoid character, or for cases where the inflammation has existed for a considerable time before diaphoretics are employed. Given at an early period in acute inflammatory diseases, opium never fails to excite vascular action, and to aggravate all the symptoms of fever. Opium, therefore, is not to be used, unless to allay the pain and irritation from a surgical operation, or from the recent infliction of an external injury. Indeed, unless when the patient is very nervous, and complains much of pain, its use, even after chirurgical operations, had, I believe, in general, better be abstained from, as it almost never fails to add to the violence of the symptomatic fever, which is the necessary consequence of the operation. Its effects are often very beneficial, when the period of this fever has passed over." (See *Lectures on Inflammation*, p. 172.) Upon the whole, candour obliges me to own, that the majority of surgeons in this country are decidedly against the general use of opium in inflammation; but, after the performance of severe operations, and in all instances attended with excessive pain, truth, I believe, will justify my saying, that they are in favour of the exhibition of this remedy.

Diet and Regimen.—In all cases, the surgeon is to forbid the use of wine and spirits; and, when the inflammation is at all considerable, the same prohibition is to be made in regard to animal food. Watery, cooling, mucilaginous drinks are proper; for they keep off thirst and heat, promote perspiration, and tend to sooth the increased action of the whole arterial system. For this purpose, whey, buttermilk, barley-water, decoctions of dried fruits, water-gruel, &c. may be given.

When diluent drinks "are intended to allay thirst, as well as to promote perspiration, the addition of some vegetable acid, such as lemon-juice, or cream of tartar, renders them in general very palatable to patients. In the earlier stages of inflammation, and where the object is to induce a moisture on the skin, the mineral acids, though they might serve to quench thirst, are not to be employed, as they tend rather to check, than promote the flow of sweat." (*Thomson on Inflammation*, p. 172.)

The chamber, in which the patient lies, should not be warmer than his comfort requires; for heat tends powerfully to keep up an increased action of the sanguiferous system. For the same reason, the patient should not be covered with a superfluous quantity of bed-clothes.

The whole body, but more especially the inflamed part, should be preserved in as complete a state of rest as possible. Every one knows, that all motion, exercise, and muscular exertion, accelerate the circulation, and, hence, must have a pernicious effect on inflammation, by determining a larger quantity of blood to the part affected.

Applications. With the exception of what has been stated, concerning topical bleeding, all the foregoing remarks relate to the *general* treatment of inflammation: the *local* means remain for consideration.

It has been already observed, that phlegmon is attended with an increase of heat in the part affected, and it is an acknowledged and well-known fact, that the action of the arteries, as well as every other operation in the animal economy, is promoted and increased by the influence of heat. For this reason, an obvious indication arises, viz. to reduce the temperature of the inflamed part, by the topical application of cold, and, in particular, by continually abstracting the heat evolved in the part, by keeping up a constant evaporation from its surface.

"Of the local remedies, applied directly to inflamed parts (says Dr. Thomson) cold is undoubtedly one of the most powerful. In reducing the temperature, cold diminishes the morbid sensibility and pain of inflamed parts; and, probably, in consequence of this, the action also of the vessels, by which the inflamed parts are supplied with blood. The most common mode of employing cold is by the application to the part inflamed of cloths, which have been dipped in cold water. These are to be repeated as often as they become warm, or any relief is experienced by the patient from their use. When the inflammation is seated on the remote parts of either the upper or lower extremities of the body, the inflamed part itself may be immersed in water. This immersion, as I shall afterward have occasion to mention, has often been found useful in superficial burns. In order to increase the effect produced by cold, it has been proposed to reduce the temperature of the water below that of the surrounding atmosphere, by a proper mixture of saline bodies, as some of these are known to produce cold during their solution in water, or even in very urgent cases to apply ice or snow. The ice, however, must not be applied too long, nor in too large a quantity; for, it very quickly reduces the temperature of the part to which it is applied, and, in some instances, has been known to occasion gangrene, &c. (*On Inflammation, p.* 180.)

With the cold water applied to phlegmonous inflammation, it is usual to blend some remedies which are astringent, and supposed to have also a sedative quality. The acetite of lead, sulphate of zinc, and vinegar, seem now, indeed, to have acquired permanent celebrity for their efficacy in resolving inflammation.

Extensive experience, and long-established trials, have now fully confirmed the virtue of all those local remedies, in which the acetite of lead is the active ingredient. M. Goulard, and other French surgeons, found, that the objections to the employment of many other sedative applications in the treatment of inflammation, did not exist against the use of this preparation of lead The universal assent of modern practitioners proves, indeed, that the acetite of lead. as a local application for genuine phlegmonous inflammation, is certainly unsurpassed, if not unrivalled, in point of efficacy.

The preparations of lead are recommended by M. Goulard, as almost equally applicable to every stage of inflammation. When swellings have fully suppurated, the employment, of what he calls, the *extractum Saturni*, will almost always render it unnecessary to open them. Even in gangrene, the solution of lead is represented by this zealous writer, as a remedy deserving of the greatest confidence.

But, notwithstanding the above exaggeration, every man of experience and observation will allow, that, while there is a chance of accomplishing resolution, no local applications to phlegmonous inflammation are in general so proper as cold lotions, containing the acetite of lead.

"The manner in which it operates in curing inflammation (as Dr. Thomson observes) is not known to us, nor is it at all times easy to distinguish between the share, which the lead has in allaying inflammation, and that which is to be attributed to the coldness of the water in which it is dissolved. No one, however, will doubt of the efficacy of this remedy, who has ever felt it in his own body, or witnessed in others the soothing and agreeable effects, which it produces in excoriations of the skin, or in inflammation of mucous membranes. Lead is a remedy, which is often highly useful in excoriations from friction, in punctured wounds with inflammation of absorbent vessels, veins, nerves, &c. in slight burns, in cutaneous heat, eruptions of the face, in fractures and dislocations, in the inflammation attending scirrhus and cancer, syphilis and gonorrhœa, in wounds accompanied with excoriation from the discharges they emit, and in wounds attended with a burning sensation of pain." (*P.* 182.)

From the poisonous qualities of lead, when taken into the system, and from the possibility of this mineral being absorbed from the surface of the body, objections have arisen against the free use of its preparations, even as outward remedies in cases of inflammation. Certain it is, however, that though the possibility of such absorption is proved by the occurrence of the disorder called the *colica pictonum*, which originates in painters from the white lead absorbed into the system, yet, any ill effects from the use of lead, as an application to inflamed parts, are so exceedingly rare, that they can hardly form a serious objection to the practice. It is a fact, that, in inflamed parts, there is an impediment to absorption, and this circumstance may tend to render the employment of lead a matter of safety. Mr. B. Bell observes, that in all the experience which he had had of the external application of lead and its preparations, and in many cases, particularly of burns, where he had known the greatest part of the surface of the body covered with applications of this description for days, nay, for weeks together, he did not recollect a single instance of any disagreeable symptom being ever produced by them. Nor has Dr. Thomson ever seen the colica pictonum follow the use of Goulard. (See *Lectures on Inflammation, p.* 183.)

A lotion composed of acetite of lead, vinegar, and water, is very commonly employed. ℞. Plumbi Acetatis ℥ss. Solve in Acet. pur. ℥iv. Et adde Aq. Fontanæ distill. ℔ij. The vinegar makes the solution more complete. In all common cases, a teaspoonful of the liquor plumbi acetatis, blended with a pint of water, will be found an eligible lotion. Occasionally, bread-crumb is moistened in the fluid, and applied in the form of a poultice; but linen dipped in the lotion, and kept constantly wet with it, is mostly preferred. Thus a continual evaporation is maintained, and of course a regular abstraction of heat.

When the surgeon is afraid of employing a solution of lead, he may try one of the sulphate of zinc. One dram of this substance is to be dissolved in a pint of water, and linen, well wet with the lotion, is to be applied to the inflamed part.

Many practitioners impute very little real efficacy either to the acetite of lead, or sulphate of zinc, contained in the above applications: and they attribute all the good that is produced, entirely to the evaporation kept up from the surface of the inflamed part, and to the coldness of the fluid in which the metallic salts are dissolved Surgeons, who entertain these sentiments, think the application of simple cold water quite as efficacious as that of any medicated lotions.

There are particular cases of inflammation, in which the extravasation of blood and lymph, in the interstices of the inflamed part, is exceedingly copious, and the swelling considerable, but the pain and redness not particularly great. In such instances, it is an indication to rouse the action of the absorbents, in order that those vessels may remove the extravasated fluid, and with this view, a more powerful discutient lotion may be employed than in other cases, and sometimes, it is even better to use embrocations and liniments, than any sort of lotion. The following discutient lotions are often employed: ℞ Ammoniæ Muriatæ ℥ss. Aceti, Spiritûs Vini rectificati ; sing. ℔j. M. ℞. Liq. Ammon. Acet. Spir. Vini rectif. ; Aq. Distillatæ ; sing. ℥iv. M. The Liq. Ammoniæ Acet. also alone answers very well.

When the part affected with inflammation is not very tender, or when it lies deep, applications of the vegetable acid are often had recourse to with considerable advantage; and the most effectual form of using it seems to be a poultice made with vinegar and crumb of bread. In such cases, it has been thought, that an alternate use of this remedy, and the saturnine lotion, has produced more beneficial effects, than are commonly observed from a continued use of one of them. (*B. Bell.*) However, surgeons of the present day seem to think, that vinegar can be as advantageously applied in the form of a lotion, as in that of a poultice, and, certainly, with less trouble.

Alcohol and æther have acquired some celebrity as local remedies for inflammation. No doubt one great reason why they are not more extensively used for this purpose is, the expense attending such treatment, as these fluids evaporate with great rapidity. Alcohol may possibly prove useful from its astringent qualities; but it seems much more rational to impute both its virtue, and that of æther, to the powerful manner, in which their evaporation deprives the inflamed part of its heat.

Warm Applications. The absurdity of attempting to reconcile every useful practice with a philosophical theory, is, in no instance, more strikingly exemplified, than in the opposite sorts of local applications, which are of service in inflammation. The generality of cases undoubtedly receive most relief from the use of cold sedative astringent lotions: but there are constitutions and parts, which derive most service from the local employment of warm emollient remedies.

Were I to endeavour to define the particular instances, in which the latter applications avail most, I should take upon me a task, which has baffled all the most able surgical writers. The first stage of the acute ophthalmy, and the hernia humoralis, or inflamed testicle, may be specified, however, as examples, in which, generally speaking, warm emollient applications are better than cold astringent ones. Yet, even with respect to inflammation of the testis, there is some difference of opinion about the superiority of cold or warm applications. Mr. James's sentiments are as follows: in the treatment it is of importance to consider the differences of the cause: thus, in mumps and rheumatism, the constitution is chiefly to be attended to, and cold applications are certainly improper. When it (the inflammation of the testis) arises from a blow, after leeches have been freely employed, fomentations are the best remedy. But Mr. James thinks, that this is not the case, in many instances of hernia humoralis from gonorrhœa, where cold applications are preferable; but, he owns, that the feelings of the patient will best determine the point. (*James on Inflammation, p.* 164.)

"Fomentations, or embrocations with warm water, (as a judicious writer has remarked) are often a very powerful means of abating internal inflammation. This effect is very apparent in some of the deeper seated inflammations, as in the inflammation of the urinary bladder, intestines, or other viscera contained within the cavity of the abdomen. The warmth, in this case, may be applied to the surface of the abdomen, by bath or fomentation, or, in the way of injection, by the anus, &c. In some inflammations of the joints, warmth also is found to be very useful. These, however, are inflammations, which have a tendency to the chronic state. (See *Thomson on Inflammation, p.* 188.)

If we may judge by the feelings of certain patients, there are undoubtedly particular constitutions, in which the local use of warm remedies produces greater relief than that of cold ones. This circumstance, however, does not generally happen; and, as warm emollient applications, of all kinds, have the most powerful influence in promoting suppuration, a fact admitted by every experienced practitioner, the use of such remedies, while the resolution of inflammation is practicable, must be highly censurable. But, I am ready to grant, that in all cases of inflammation, which manifestly cannot be cured without suppuration, the emollient plan of treatment ought to be at once adopted; for, the sooner the matter is formed, the sooner the inflammation itself is stopped. The inflammation attending contused and gunshot wounds, and that accompanying boils and carbuncles, are of this description. The inflammation, originating in fevers, commonly ends in suppuration, and, in such instances, perhaps, it might be advantageous, also, to employ at once the emollient treatment.

Warmth and moisture together, in other words fomentations, are commonly had recourse to in cases of inflammation; but, when the warmth is as much as the sensitive principle can bear, it excites action. Whether it is the action of inflammation, or the action of the contraction of the vessels, is unknown. We see that many patients cannot bear warmth, and, therefore, it might be supposed to increase the action of dilatation, and do harm. But, if the pain should arise from the contraction of the inflamed vessels, benefit would be the result; though we must doubt that this change is produced, as making the vessels contract would probably give ease. (*Hunter.*)

From the preceding observations, we must perceive how vain it is to theorize on this subject which even puzzled the genius and penetration of a Hunter. In addition to what has been already observed, I feel totally incapable of giving any useful practical advice, with respect to those cases, in which warm emollient applications should be used in preference to cold astringent ones. I can, however, with confidence remark, that the surgeon who consults the feelings and comfort of the patient on this point, will seldom commit any serious error. Hence, in all cases, in which the first kind of topical applications seem not to produce the wonted degree of relief, let the second sort be tried. From the opportunity of comparison, a right judgment may then be easily formed.

The poultice made of the powder of linseed is so easily prepared, that the old bread and milk poultice is now seldom employed. As much hot water is to be put into a basin, as the size of the poultice requires, and then the linseed powder is to be gradually mixed with the water, till the mass is of a proper consistence. Frequently, a little sweet oil is also added to keep the application longer soft and moist.

Fomentations are only to be considered as temporary applications, while the emollient poultices are the permanent ones. The former are, at most, never used more than three times a day, for the space of about half an hour each time. Two of the best are the following:—℞. Lini contusi ℥j. Chamæmeli ℥ij. Aq. Distill. ℔vj. Paulisper coque et cola. Or, ℞. Papaveris albi exsiccati ℥iv. Aq. Puræ ℔vj Coque usque remaneant ℔ij. et cola.

Some practitioners, however, are inclined to think warm water alone quite as efficacious as the decoctions of particular herbs. Thus Dr. Thomson observes, "herbs are now seldom used in the way of fomentation, unless in compliance with ancient custom, or with the prejudices of particular individuals. The discutient power of the warm water may be increased by the addition of various substances, such as vinegar, spirits of wine; saline substances, such as common salt, acetite and muriate of ammonia. But, these warm and stimulating embrocations are used chiefly in the passive, chronic, or more indolent species of inflammation." (See *Lectures on Inflammation*, p. 189.)

By pursuing the treatment recommended above, the resolution of the inflammation will in general begin to take place, either in the course of three or four days, or in a shorter space of time. At all events, it may usually be known before the expiration of this period, how the disorder will terminate. If the heat, pain, and other attending symptoms abate; and, especially, if the tumour begins to decrease, without the occurrence of any gangrenous appearances; we may then be almost certain, that, by a continuance of the same plan, a total resolution will in time be effected.

On the other hand, when all the different symptoms increase, and particularly when the tumour becomes larger, and softish, attended with a more violent throbbing pain, we may conclude, that the case will proceed to suppuration. Hence, an immediate change of treatment is indicated, and such applications, as were proper while resolution seemed practicable, are to be left off, and others substituted. This remark relates to the employment of cold astringent remedies, which, when suppuration is inevitable, only do harm, by retarding what cannot be avoided, and affording no relief of the pain and other symptoms. If the inflammation, however, should already be treated with emollients, no alteration of the topical applications is requisite, in consequence of the inevitability of the formation of matter. Indeed, emollient poultices and fomentations are the chief local means both of promoting suppuration, and diminishing the pain, violent throbbing, &c. which always precede this termination of phlegmonous inflammation.

But, besides the substitution of warm emollient applications for cold astringent lotions, practitioners have decided, that it is also prudent, as soon as the certainty is manifest, to relinquish the free employment of evacuations, particularly bloot-letting, and to allow the patient a more generous diet. When the system is too much reduced by the injudicious continuance of rigorous antiphlogistic treatment, the progress of the ensuing suppuration is always retarded in a disadvantageous manner, and the patient is rendered too weak to support either a long-continued, or a profuse discharge, which it may not be possible to avoid.

I shall conclude this article with briefly noticing blisters, rubefacients, issues, and synapisms, as means often employed for the relief of particular cases of inflammation. "Blisters (says Dr. Thomson) are never applied to a part which is actually inflamed. They seem to be chiefly useful by exciting inflammation in a contiguous part. It is from this tendency, which blisters have to produce inflammation, and of course a certain degree of fever, that they are seldom to be employed in acute inflammatory cases, till the constitutional symptoms are by other means in some measure subdued."—(*P.* 187.)

"Of the same nature, though milder in their operation, than blisters, are the whole class of rubefacients. They produce a determination of blood to the parts to which they are applied, and in a manner not yet well understood, occasion a diminution in the action of the vessels, and consequently in the quantity of blood with which the inflamed parts are supplied. This influence is exerted more or less directly in different instances. The extremities of the intercostal arteries may open both on the pleura lining the chest, and on the surface of the skin covering it, and whatever excites an increased flow of blood into one of these textures, may be conceived to be attended with a proportionally diminished flow into the other texture. But, blisters are found by experience to be efficacious in removing inflammation, where no communication whatever can be traced between the blood-vessels of the inflamed part, and that to which the blister is applied. We have examples of this mode of action in the beneficial effects obtained from the application of blisters in inflammation of the brain and the membranes immediately covering it, of the lungs and intestines, or of any of the viscera contained in the cavity of the abdomen. The nearer in such instances the blister or rubefacient can be applied to the part inflamed, the greater is the relief obtained; and in general, I believe, it may be laid down as a rule, that the relief, which they afford, will be proportional to the degree of inflammation which they excite." (See *Thomson on Inflammation, p.* 187, 189.)

Synapisms, blisters, and issues are in many instances applied to situations, which are so remote from and unconnected by vessels with the inflamed parts, that it is impossible to explain their mode of operation except through the medium of the nervous system. "The irritation of a synapism applied to the foot (says Dr. Thomson) may relieve an attack of gout in the head, or stomach. Bathing the feet and legs gives relief in inflammation of the bowels; and the application of a blister, or caustic to the neck, may cure an inflammation of the eyes, &c. (*P.* 189.) Here counter-irritation is the principle by which an explanation is usually attempted. (See *Blisters.*)

Van Swieten's Commentaries on Boerhaave; Gorter's Compendium Medicinæ, 4to. Lugd. 1731; *and Chirurgia Repurgata, 4to. Lugd.* 1742. *Vacca, Liber de Inflammationis morbosâ, quæ in humano corpore fit, naturæ, causis, effectibus, et curatione,* 1765. *D. Magenisie, the Doctrine of Inflammations, founded upon reason and experience; and entirely cleared from the contradictory systems of Boerhaave, Van Swieten, and others, 8vo. Lond.* 1768. *Cullen's First Lines of the Practice of Physic, Vol.* 1. *John Hunter, on the Blood, Inflammation, &c. 4to. London,* 1794. *Burns's Dissertations, 8vo. Glasgow,* 1800. *Thomson's Lectures on Inflammation, Edinb.* 1813. *Boyer, Traité des Maladies Chir. T.* 1. *Delpech, Précis Elém. des Mal. Chir. T.* 1, *chap.* 1, *Paris,* 1816. *John Herdman, Diss on White Swelling, and the Doctrine of Inflammation, 8vo. Edinb.* 1802. *F. J. V. Broussais. Hist. des Phlegmasies ou Inflammations Chroniques, &c.* 2 *Tom. 8vo. Paris,* 1808. *C. Wenzel, über die Induration und das Geschwür in indurioten Theilen, 8vo. Mainz.* 1815, *Wilson Philip, on Febrile Diseases, Part* 2. *Introduction, Ed.* 3; *and An Experimental Inquiry into the Laws of the Vital Functions, Ed.* 2. *8vo. Lond.* 1818. *Caleb H. Parry, Elements of Pathology and Therapeutics, 8vo. Lond.* 1815. *Also, An Experimental Inquiry into the Nature, &c. of the Arterial Pulse, 8vo. Lond.* 1816. *Charles H. Parry, Additional Experiments on the Arteries of Warm-blooded Animals, &c. 8vo. Lond.* 1819. *James Wilson, Lectures on the Blood, and on the Anatomy, Physiology, and Surgical Pathology of the Vascular System, 8vo. Lond.* 1819. *C. H. Ronnefeld, Animadversiones nonnullæ ad Doctrinam de Inflammatione, 4to. Lips.* 1817. *C. Hastings, a Treatise on Inflammation of the Mucous Membrane of the Lungs, &c. 8vo. Lond.* 1820. *J. H. James, Observations on some of the General Principles and on the particular Nature and Treatment of the different Species of Inflammation, 8vo. Lond.* 1821. *This work, and those of Mr. J. Hunter, Mr. Wilson, Mr. J. Burns, Drs. Parry, Philip and Hastings, deserve attentive perusal by every body desirous of forming a correct judgment of the nature of inflammation.*

INJECTION. A fluid intended to be thrown against, or into a part of the body by means of a syringe. Thus port wine and water form an injection, which is used by surgeons for radically curing the hydrocele, and, for this purpose, it is introduced into the cavity of the tunica vaginalis, where it excites the degree of inflammation necessary to produce an universal adhesion between this membrane and the albuginea.

Thus many fluid remedies are introduced into the urethra and vagina for the cure of gonorrhœa. In the article *Gonorrhœa,* will be found an account of the best injections employed for its relief. A few additional remedies of this class are here subjoined.

INJECTIO ACIDI MURIATICI. ℞. Aquæ distil ℥iv. Acid. Mur. gutt. viij. Misce. Useful when the scalding is a very troublesome symptom.

INJECTIO ALUMINIS.—℞ Alum ʒj. Aq. pur. ℥vj. Misce.—Successfully employed by Dr. Cheston, as an injection in affections of the rectum, either when the internal coat is simply relaxed, and disposed to prolapsus, or when it is studded with loose fungated tumours. In such cases, camphor is also of service. The quantity of alum may be increased, if the parts will bear it.

INJECTIO CUPRI AMMONIATI. ℞. Liquoris Cupri ammon. gutt. xx. Aquæ rosæ ℥iv. Misce. Strongly recommended by Mr. Foot.

INJECTIO QUERCUS. ℞. Decocti quercûs ℔j. Aluminis purificat. ℥ss. Misce. May be used, when the rectum, or vagina, is disposed to prolapsus from relaxation, or in cases of gleet.

* INNOMINATA ARTERIA. By referring to the article *Aneurism,* in the Appendix, will be seen the case at full length, in which professor Mott of this city tied the Arteria Innominata for the purpose of directing the blood from an aneurism of the subclavian artery; together with some remarks upon the criticisms which have appeared against it. *Am Ed.*

INOSCULATION denotes, in the language of anatomy and surgery, the union of vessels by conjunction of their extremities. It is generally synonymous with *anastomosis,* though sometimes a distinction is made, *anastomoses* signifying the union of vessels by minute ramifications, and *inoscu-*

lation a direct communication by trunks. The great use of inosculations is to facilitate and ensure the continuance of the circulation, when the large trunks of vessels are obstructed by pressure, disease, &c. Thus, in cases of aneurism, when the main artery of a limb is tied, the inosculations of the branches, given off above the ligature, with other branches arising below it, form at once a channel, through which the lower part of the limb is supplied with blood. Were there no such arrangement in the human body as inosculations, aneurisms could never be cured by a surgical operation. So infinitely numerous indeed are these inosculations, that they do the office of the subclavian, carotid, and external and internal iliac arteries, when these vessels are tied, and upon this fact is founded the success of some of the most brilliant operations in modern surgery. (See *Aneurism.*) Even the aorta itself may be perfectly obstructed, the circulation go on, and every part be fully supplied with blood. (See *Aorta.*) In dogs, the abdominal aorta has been tied, without the circulation in the hinder extremities being stopped. (See *the Experiments of Mr. A. Cooper in Med. Chir. Trans. Vol.* 2, *p.* 258;) and the operation, performed a few years ago, in Guy's hospital, tends to prove that the same thing is possible in the human subject (See *Aorta.*) From the observations of the same distinguished surgeon it appears, that the arteries, which form the new circulation in a limb, after the obliteration of the principal artery, are not only enlarged but tortuous. Any great increase, however, in the diameter of the anastomosing vessels is but slowly produced; for Mr. A. Cooper has injected a limb several weeks after the operation for popliteal aneurism, without being able to force the injection through communicating vessels into the parts below. The limb must have active exercise before the vessels enlarge much. On account of the arteries not very readily enlarging, the limbs of persons who have undergone the operation for aneurism, are for a considerable time weaker than natural. They feel the influence of cold more, and are more disposed to ulcerate from slight causes. Hence, the utility of covering them with flannel, or fleecy hosiery. Hence, the rashness of applying cold washes, bandages, &c. (See *A. Cooper's remarks in the above-mentioned Vol. p.* 249, *et seq.*)

In another place, the same gentleman has published an interesting description of the anastomoses of the arteries of the groin. "Hypothesis (says he) would lead to a belief, that anastomosing vessels would be numerous in proportion to the time which had elapsed from the operation; but, the reverse of this is the fact; for, at first, many vessels convey the blood, originally conducted by the principal artery. But, gradually, the number of these channels becomes diminished and, after a length of time, a few vessels, conveniently situated for the new circulation, become so much enlarged, as to be capable of conveying an equal portion of blood to that which passed through the original trunk."

The experience of Mr. A. Cooper also tends to confirm the important fact, that "it is desirable in femoral aneurism, if not, indeed, in all others, to perform the operation in an early state of the disease," as the patient then recovers the use of the limb much more quickly, than when the tumour has been suffered to attain a large size. (See *Medico-Chirurg. Trans. Vol.* 4, *p.* 425, *et seq.*)

INTERRUPTED SUTURES. See *Sutures.*

INTESTINES WOUNDED. See *Wounds of the Abdomen.*

INTROSUSCEPTION, or *Intussusception*, (from *intus*, within, and *suscipio*, to receive.) Called also *Volvulus.* Is a disease produced by the passing of one portion of an intestine into another, and it is commonly from the upper passing into the lower part. (*J. Hunter.*) On this subject, Mr. G. Langstaff has published an interesting paper, in the *Edinb. Surg. Journal. No. XI;* which I shall take the liberty of freely quoting.

This gentleman remarks, that the small intestines of children are so often affected with introsusception in a slight degree, that most practitioners must have had opportunities of observing the form of the complaint. The greatest part of three hundred children who died either of worms, or during dentition, at the Hôpital de la Saltpetriere, and came under the examination of M. Louis, had two, three, four, and even more volvuli, without any inflammation of the parts, or any circumstances leading to a suspicion that these affections had been injurious during life. "These cases (says M. Louis) seem to prove, that introsusception may be formed, and destroyed again by the mere action of the intestines." (*Mém. de l'Acad. de Chirurg. 4to. Tom.* 4. *p* 222.) This opinion is confirmed by the authority of Dr. Baillie, (*Morbid Anatomy, 2d Edit. p.* 162) who observes, that, "in opening bodies, particularly of infants, an intussusception is not unfrequently found, which had been attended with no mischief; the parts appear perfectly free from inflammation, and they would probably have been easily disentangled from each other by their natural peristaltic motion."

The disease, continues Mr. Langstaff, assumes a more dangerous, and indeed, generally a fatal form, when it occurs at the termination of the small intestines in the cœcum. A contracted state of the part to be introsuscepted, and a dilatation of that portion of the canal into which this part must pass, are essential conditions to the formation of a volvulus; and those exist nowhere so completely as in the situation here alluded to. The extent to which the affection proceeds in this situation, would appear almost incredible, if it were not proved by well-authenticated facts. A person who considered the natural situation and connexion of the parts, would of course require the strongest evidence before he would believe, that the ileum, cœcum, ascending and transverse portions of the colon, may descend into the sigmoid flexure of the latter intestine; nay more, that they may pass through the rectum, and be protruded in the form of a procidentia ani. Such cases, however, are recorded. (*Langstaff, in Edinb. Med. and Surgical Journal, No. XI.*)

This gentleman next relates the case of a child three months old, the body of which he inspected after death, and found to confirm the truth of the preceding account. The example was particular in their being in addition to an extensive introsusception in the usual way, a smaller invagination in the opposite direction, like what probably occurred in the case related by Mr. Spry; *Med. and Physical Journal, No. XI* Sir E. Home, (*Trans. of a Society for Medical and Chir. Knowledge, Vol.* 1.) mentions an example of a retrograde introsusception, in which a worm was found coiled up round the introsuscepted part. The disease took place in a boy who had swallowed arsenic.

If the following mode of accounting for introsusception be just, it will most frequently happen downwards, although there is no reason why it may not take place in a contrary direction; in which case, the chance of a cure will be increased by the natural actions of the intestinal canal tending to replace the intestine; and probably from this circumstance it may oftener occur than commonly appears.

When the introsusception is downwards, it may be called *progressive*, and when it happens upwards, *retrograde*. The manner in which it may take place is, by one portion of a loose intestine being contracted, and the part immediately below relaxed and dilated; under which circumstances, it might very readily happen by the contracted portion slipping a little way into that which is dilated, not from any action in either portion of intestine, but from some additional weight in the gut above. How far the peristaltic motion, by pushing the contents on to the contracted parts, may force these into the relaxed, Mr. Hunter will not determine, but is inclined to suppose that it will not.

By this mode of accounting for an accidental introsusception, it may take place either upwards or downwards; but if a continuance or an increase of it arises from the action of the intestines, it must be when it is downwards, as we actually find to be the case; yet this does not explain those in which a considerable portion of intestine appears to have been carried into the gut below: to understand these, we must consider the different parts which form the introsusception. It is made up of three folds of intestine; the inner, which passes down, and being reflected upwards, forms the second or inverted portion, which being reflected down again, makes the third or containing part, that is the outermost, which is always in the natural position. (*J. Hunter.*)

The outward fold is the only one which is active, the inverted portion being perfectly passive, and squeezed down by the outer, which inverts more of itself, so that the angle of inversion in this case is always at the angle of reflection of the outer into the middle portion or inverted one, while the innermost is drawn in. From this we can readily see how an introsusception, once begun, may have any length of gut drawn in.

The external portion acting upon the other folds in the same way as upon any extraneous matter, will by its peristaltic motion urge them further; and if any extraneous substance is detained in the cavity of the inner portion, that part will become a fixed point for the outer or containing intestine to act upon. Thus it will be squeezed on, till at last the mesentery preventing more of the innermost part from being drawn in, will act as a kind of stay, yet without entirely hindering the inverted outer fold from going still further. For it being the middle fold that is acted upon by the outer, and this action continuing after the inner portion becomes fixed, the gut is thrown into folds upon itself; so that a foot in length of intestine shall form an introsusception not more than three inches long.

The outer portion of intestine is alone active in augmenting the disease when once begun; but if the inner one were capable of equal action in its natural direction, the effect would be the same, that of endeavouring to invert itself, as in a prolapsus ani; the outer and inner portions, by their action, would tend to draw in more of the gut, while the intermediate part only would, by its action, have a contrary tendency.

The action of the abdominal muscles cannot assist in either forming or continuing this disease, as it must compress equally both above and below, although it is capable of producing the prolapsus ani.

When an introsusception begins at the valve of the colon, and inverts that intestine, we find the ileum is not at all affected; which proves that the mesentery, by acting as a stay, prevents its inversion. (*J. Hunter.*)

From the natural attachment of the mesentery to the intestines, one would, at the first view of the subject, conceive it impossible for any one portion of gut to get far within another; as the greater extent of mesentery that is carried in along with it would render its further entrance more and more difficult, and we should expect this difficulty to be greater in the large intestines than in the small, as being more closely confined to their situation; yet one of the largest introsusceptions of any known was in the colon, as related by Mr. Whateley. (*Vid. Phil. Trans. Vol.* 76, *p.* 305.)

The introsusception appeared to have begun at the insertion of the ileum into the colon, and to have carried in the cœcum with its appendix. The ileum passed on into the colon, till the whole of the ascending colon, the transverse arch, and descending colon, were carried into the sigmoid flexure and rectum. The valve of the colon being the leading part, is at last got as low as the anus; and when the person went to stool he only emptied the ileum, for one half of the large intestines being filled up by the other, the ileum alone, which passed through the centre, discharged its contents. (*J. Hunter.*)

Two questions of considerable importance present themselves to the mind in considering this subject; whether there are any symptoms by which the existence of the affection can be ascertained during life? And whether we possess any means of relieving it, supposing that its existence could be discovered? The symptoms attending an introsusception are common to inflammation of the intestines, hernia and obstruction of the canal, from whatever cause, and a volvulus is the least frequent cause of such symptoms. (*Langstaff.*) In the case published by this gentleman, and in those related by Mr. Hunter and Mr. Spry, the seat of the disease was clearly denoted by a hard tumour on the left side of the abdomen. This circumstance, together with the impossibility of throwing up more than a very small quantity of fluid in clysters, (*Hevin, Spry, Langstaff,*) and the presence of the other symptoms, would lead us to suspect the nature of the disorder. If the invaginated portion descended so low as to protrude through the anus, and we could ascertain that it was not an inversion of the gut, the case might be considered as clear, and we should have no hesitation in delivering a prognosis, which, by preparing the friends for the fatal termination, would exonerate us from all blame on its occurrence. (*Langstaff.*)

In the treatment of this disease, bleeding, to lessen the inflammation that might be brought on, and quicksilver to remove the cause, have been recommended.

Quicksilver would have little effect either in one way or the other, if the introsusception were downward; for it is to be supposed that it would easily make its way through the innermost contained gut, and, if it should be stopped in its passage, it would by increasing its size, become a cause (as before observed) of assisting the disease. In cases of the retrograde kind, quicksilver, assisted by the peristaltic motion, might be expected to press the introsusception back; but even under such circumstances it might get between the containing and inverted gut into the angle of reflection, and by pushing it further on, increase the disease it is intended to cure. (*J. Hunter.*)

Every thing that can increase the action of the intestine downwards, is to be particularly avoided, as tending to increase the peristaltic motion of the outer containing gut, and thus to continue the disease. Medicines can never come into contact with the outer fold, and having passed the inner, can only act on the outer further down, and therefore cannot immediately affect that portion of the outer which contains the introsusception; but we must suppose that whatever affects or comes into contact with the larger portion of the canal, so as to throw it into action, will also affect by sympathy any part that may escape such application. Mr. Hunter therefore advises giving vomits, with a view to invert the peristaltic motion of the containing gut, which will have a tendency to bring the intestines into their natural situation.

If this practice should not succeed, it might be proper to consider it as a retrograde introsusception, and by administering purges endeavour to increase the peristaltic motion downwards. (*J. Hunter.*)

I cannot agree with Mr. Langstaff that it is to be regretted, Hunter's name should be affixed to the preceding proposal, or that it is an absurd one; for purgatives and emetics were only recommended to increase the peristaltic action, the former downward, the latter upward, according as the supposed nature of the case might require, and this effect they certainly would have, notwithstanding vomiting is an early and constant symptom of the disease, and an insuperable constipation an equally invariable attendant. The method I allow, however, is not very hopeful, and may sometimes be frustrated by the formation of adhesions. According to Mr. Langstaff, the *Recherches Historiques sur la Gastrotomie dans le cas de Volvulus, par M. Hevin,* (*Mem. de l'Acad. de Chirurgie, Tom.* 4, *4to.*) contain many interesting facts and sound reasoning. There we find a very ample discussion of the question, concerning the propriety of opening the abdomen, in order to disentangle the introsuscepted intestine; a proposal which M. Hevin very properly condemns.

If the equivocal and uncertain nature of the symptoms of volvulus were not sufficient to deter us from undertaking an operation, which, under the most favourable circumstances, could not fail to be extremely difficult, and imminently hazardous to the patient, the state of the invaginated parts would entirely banish all thoughts of such an imprudent attempt; for the different folds of the intestine often become agglutinated to each other, so that they can hardly be withdrawn after death; (*Simpson, Edinburgh Med. Essays, Vol.* 6, *Hevin's 4th Obs. Malcolm, Physical and Lit. Essays, Vol.* 2, *p.* 360. *Hunter, Med. and Chir. Trans. and Soemmering in Transl. of Baillie's Morb. Anat.*) Nay, the stricture on the introsuscepted part may cause it to inflame, and even mortify. (*Soemmering.*) It is very clear that in this state of parts, the operation of gastrotomy would be totally inadmissible, even if the symptoms could clearly indicate the nature of the case and the affected part could be easily reached and examined. (*Langstaff.*)

The forcible injection of clysters was found useless by Dr. Monro, and the agglutination of the parts must produce an insuperable obstacle to the bowels being pushed back by this means. (*Langstaff.*) Some have proposed the employment of a long bougie, or a piece of whalebone, to push back the intestine; and this proposal may be adopted, when we are furnished with an instrument, adapted to follow the windings of the large intestine to its origin in the right ilium, without any risk of perforating the gut in its course. (*Langstaff.*)

It must be confessed, that both surgery and medicine are almost totally unavailing in the present disease. Yet, here, as in many other instances, the resources of nature are exhibited in a most wonderful and astonishing manner, while those of art completely fail. The invaginated portion of intestine sometimes sloughs, and is discharged *per anum*, while the agglutination of the parts preserves the continuity of the intestinal canal. The annals of medicine furnish numerous instances, in which long pieces of gut have been discharged in this manner, and the patient has recovered. Hence, some hope may be allowed under the most unpromising circumstances. In a case, related in Duncan's Commentaries, eighteen inches of small intestine were voided *per anum*, Vol. 9 p. 278. Three similar instances occur in M. Hevin's Memoir; twenty-three inches of colon came away in one of these, and twenty-eight of small intestines in another. Other cases occur in the Physical and Literary Essays, Vol. 2, p. 361; in Duncan's Annals, Vol. 6, p. 298; in the Medical and Chirurgical Transactions, Vol. 2; where Dr Baillie states, that a yard of intestine was voided. The patients did not, however, ultimately survive in every one of these instances. (*Langstaff in Edinb. Med. and Surgical Journal.*)

Langenbeck has recorded an instance, in which a prolapsus of the large intestines protruded half an ell out of the anus. The disease had lasted thirty weeks. Langenbeck made an incision into, or rather through, the protruded inverted bowel, immediately below the sphincter ani. He first divided the inner vascular coat, then the muscular, and lastly the outer coat with great caution. He now discovered, within the protruded inverted bowel, which he had opened, another part of the intestinal canal, which was not yet inverted. He remarked upon it the appendices epiploicæ, and the white shining peritonæal coat. This last portion would also have become inverted, had the disease continued. He next reduced the latter uninverted part, and afterward succeeded in replacing the rest of the protrusion; which did not fall down again when the boy had stools. No bad symptoms immediately followed; but, the lad being very weak, survived only eight days (See *Bibl für die Chir. B.* 3 *p.* 756, *Gott.* 1811.)

Hevin in Mem. de l'Acad. de Chir. Hunter's Observations, in the Trans. of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. 1, *p.* 103, *et seq. L'Encyclopédie Methodique, Partie Chir. Art. Gastrotomie. A. Vater, De Invaginatione Intestinorum:* (*Haller Disp. Anat.* 1, 481.) *C. H. Velse. De Mutuo Intestinorum Ingressu, &c. Lugd* 1742. (*Haller, Disp. Anat* 7. 97.) *J. C. Lettsom, The History of an Extraordinary Intus-susception, with an account of the dissection by Mr. T. Whaetly.* 4*to. Lond.* 1786. *And Langstaff's Remarks in the Edinb. Med. and Surgical Journal, No. XI.*

INVERSION OF THE UTERUS. *See Uterus, Inversion of.*

IRIS, PROLAPSUS OF. As long as the humours, which fill the cavity of the eye, and in which the iris is immersed and suspended, remain in perfect equilibrium with respect to each other, that membrane retains its natural position, and a suitable distance from the cornea, and although of a very delicate and yielding texture, it contracts, and relaxes itself, without ever forming any irregular fold. But, when the aqueous humour has escaped through an accidental, or artificial, opening in the cornea, the iris is pressed forward by the humours situated behind it, and is urged gradually towards the cornea until a portion of it protrudes from the eye, at the same opening, through which the aqueous humour made its escape. Thus a small tumour of the same colour as the iris forms on the cornea, sometimes named *staphyloma of the iris*; sometimes *procidentia*, or *prolapsus of the iris.*

The causes of this complaint are such wounds and ulcers of the cornea, as make an opening of a certain extent into the anterior chamber of the aqueous humour, and such violent contusions of the eyeball, as occasion a rupture of the cornea. If the edges of a wound in this situation, whether accidental, made for the purpose of extracting the cataract, or evacuating the matter of hypopium, be not brought immediately afterward into reciprocal contact, or continue not sufficiently agglutinated together to prevent the escape of the aqueous humour from the anterior chamber, regularly as this fluid is reproduced; the iris, drawn by its continual flux towards the cornea, glides between the lips of the wound, becomes elongated, and a portion of it gradually protrudes beyond the cornea, in the form of a small tumour. The same thing takes place, whenever the eyeball unfortunately receives a blow, or is too much compressed by bandages, during the existence of a recent wound of the cornea. Also, if the patient should be affected, in this circumstance, with a spasm of the muscles of the eye, with violent and repeated vomiting, or with strong and frequent coughing, a prolapsus of the iris may be caused. When an ulcer of the cornea penetrates the anterior chamber of the aqueous humour, the same inconvenience happens more frequently, than when there is a recent wound of that membrane; for, the solution of continuity in the cornea, arising from an ulcer, is attended with loss of substance, and in a membrane, so tense and compact as this is, the edges of an ulcer do not admit of being brought into mutual contact.

The little tumour is likewise necessarily of the same colour as the iris, viz. brown, or grayish, being surrounded at its base by an opaque circle of the cornea, on which membrane there is an ulcer, or a wound of not a very recent description.

As it usually happens, that the cornea is only penetrated at one part of its circumference by a wound, or ulcer, so in practice, only one prolapsus of the iris is commonly met with in the same eye. But if the cornea should happen to be wounded, or ulcerated at several distinct points, the iris may protrude at several different places of the same eye, forming an equal number of small projecting tumours on the surface of the cornea. Scarpa has seen a patient who had three very distinct protrusions of the iris on the same cornea, in consequence of three separate ulcers penetrating the anterior chamber of the aqueous humour; one in the upper, and two in the lower segment of the cornea.

If, says Scarpa, the delicate structure of the iris; the great quantity of blood-vessels, which enter it; and the numerous nervous filaments, which proceed to be distributed to it, as a common centre; be considered, the nature and severity of those symptoms may be readily accounted for, which are wont to attend this disease, however small the portion of the iris projecting from the cornea may be, even if no larger than a fly's head. The hard and continual frictions to which this delicate membrane is then exposed, in consequence of the motions of the eyelids; together with the access of air, tears, and gum to it; are causes quite adequate to the production of continual irritation; and the blood which tends to the point of the greatest irritation, cannot fail to render the projecting portion of the iris much larger, almost directly after its protrusion, than it was at the moment of its first passing through the cornea. Hence it becomes, soon after the prolapsus, more incarcerated and irritated, than it was at first. In the incipient state of the complaint, the patient complains of a pain, similar to what would arise from a pin penetrating the eye; next he begins to experience, at the same time, an oppressive sensation of tightness, or constriction, over the whole eyeballs. Inflammation of the conjunctiva, and eyelids, a burning effusion of tears, and an absolute inability to endure the light, successively take place. As the protruded portion of the iris drags after it all the rest of this membrane, the pupil assumes of mechanical necessity an oval shape, and deviates from the centre of the iris, towards the seat of the prolapsus. The intensity of the pain, produced by the inflammation, and other symptoms attendant on the prolapsus of the iris, does not, however, always continue to increase.

Indeed, in practice, cases of old protrusions of the iris often occur, where, after the disease has been left to itself, the pain and inflammation spontaneously subside, and the tumour of the iris becomes almost completely insensible. Scarpa met with a man, fifty years of age, who had had a prolapsus of the iris in the right eye ten weeks; it was as large as two grains of millet seed; the patient bore it with the greatest indifference, and without any other inconvenience, than a little chronic redness of the conjunctiva, and a difficulty of moving the eyeball freely, in consequence of the friction of the lower eyelid against the tumour formed by the iris. When the extremity of the finger was applied, the little tumour felt hard and callous.

In the early stage of this disease, some direct the iris to be replaced in its proper situation by means of a whalebone probe; and in case of difficulty, to make a dilatation of the wound, or ulcer of the cornea, by an incision, proportioned to the exigency of the case, as is done for the return of a strangulated intestinal hernia. Others only recommend stimulating the prolapsed portion of the iris with the view of making it contract and shrink into the eye; or suddenly exposing the eye affected to a very vivid light, in the belief, that as the pupil then forcibly contracts, the piece of the iris, engaged between the lips of the wound, or ulcer of the cornea, will rise to its proper place. However, Scarpa represents all such methods as absolutely useless, and even dangerous. Supposing it were possible, by such attempts, to reduce the iris to its proper situation, without tearing or injuring it, still the aqueous humour would escape again through the wound, or ulcer of the cornea, so that the iris, when replaced, would fall down the moment afterward, and project from the cornea in the same way as before the operation. Hence, though Scarpa admits that the prolapsus of the iris is a serious accident, he argues that as surgery has no means of suppressing at once, or at least, of suspending the escape of the aqueous humour through a wound, much less through an ulcer of the cornea, when either exceeds certain limits, the prolapsus of the iris, far from being an evil in such unfavourable circumstances, is rather useful, and, perhaps, the only means of preventing the total loss of the organ of sight, for the flap of the iris insinuates itself, like a plug, between the edges of the wound, or ulcer of the cornea, and thus completely prevents the exit of the aqueous humour.

Here I ought to observe, that Scarpa's unlimited condemnation of the plan of ever attempting to replace the iris is contrary to the advice delivered by Beer, as may be seen by referring to the article *Cataract*, where the treatment of the protrusion of the iris after the operation of extraction is noticed. And even with respect to the prolapsus of the iris from ulceration making its way through the cornea, Beer distinctly states, that a recent prolapsus of this kind, formed in the second still existing stage of ophthalmy, may not only be lessened by proper treatment, calculated to produce a quick cicatrization of the ulcer, but the iris may be again completely removed from the cornea, without any adhesion to the edge of the ulcer taking place. (*B.* 2, *P.* 63.) But where the prolapsus of the iris remains, as a consequence of previous inflammation of the eye, Beer confesses that it cannot be cured, without a partial adhesion of the iris to the cornea being left, and a dense scar on the latter membrane in the situation of the protruded iris. (*Vol. cit. p.* 66.)

In conformity to Scarpa's principles, there are two principal indications in the treatment of the recent prolapsus of the iris. The first is, to diminish, as speedily as possible, the exquisite sensibility in the protruded part of the iris; the other is gradually to destroy the projecting portion of this membrane to such a depth, as shall be sufficient to prevent the little tumour from keeping the edges of the wound, or ulcer of the cornea asunder, and retarding cicatrization. The adhesion, however, which connects the iris with the inside of the cornea, must not be destroyed

For fulfilling these indications, nothing is more effectual, than touching the portion of the iris projecting from the cornea, with the oxygenated muriate of antimony (*butter of antimony*,) or with what is more expeditious and convenient, the argentum nitratum, so as to form an eschar of sufficient depth. And, in order that this operation may be effected with quickness and precision, it is necessary that an assistant, standing behind the patient's head, should support the upper eyelid with Pellier's elevator; and that the patient should keep his eye steadily fixed on one subject.

While the assistant gently raises the upper eyelid, the surgeon must depress the lower one, with the index and middle fingers of his left hand; and with the right, he is to be ready to touch the little prominence formed by the iris, with the argentum nitratum, scraped to a point like a pencil. This is to be applied to the centre of the little tumour, until an eschar of sufficient depth is formed. The pain which the patient experiences at this moment, is very acute; but, it subsides as soon as the eye is bathed with warm milk. The caustic, in destroying the projecting portion of the iris, destroys the principal organ of sensibility, by covering it with an eschar, of sufficient depth to protect the part affected from the effect of the friction of the eyelids, and from coming into contact with the air and tears. This is the reason, not only why the sense of pricking and constriction in the eye abates after the application of the caustic, but also why the inflammation of the conjunctiva undergoes a considerable diminution, as well as the burning and copious effusion of tears.

As in the case of ulcer of the cornea, these advantages only last while the eschar remains adherent to the little tumour formed by the iris; when it falls off, as it usually does two or three days after the use of the caustic, all the above-mentioned symptoms are rekindled, with this difference, that they are less intense and acute, than they were previously, and the tumour of the iris is not so prominent as it was before the caustic was applied. When these symptoms make their appearance, the surgeon must once more have recourse to the argentum nitratum, with the precautions explained above; and he is to employ it a third, and even a fourth time, as occasion may require, until the prominent portion of the iris is sufficiently reduced to a level with the edges of the wound, or ulcer of the cornea, and no obstacle is left to the granulating process, and complete cicatrization.

There is a certain period, beyond which the application of caustic to the protruded iris becomes exceedingly dangerous, though at first it may have been highly beneficial: beyond which, the eschar, which previously soothed the pain, exasperates it, and reproduces the inflammation of the conjunctiva in almost as vehement a degree as in the beginning of the disease. This appears to Scarpa to be the case, whenever the surgeon continues to employ the caustic, after the little tumour of the iris has been destroyed to a level with the external edges of the wound, or ulcer of the cornea, and the application begins to destroy the granulations just as they are originating. Hence, as soon as the surgeon perceives, that the part of the iris, projecting from the cornea, is sufficiently lowered, and that the application of the argentum nitratum, far from allaying, only irritates the disease, he must desist entirely from using the caustic, and be content with introducing between the eye and eyelids, every two hours, the collyrium zinci sulphatis with the mucilage of quince-seeds. Every morning and evening, Janin's ophthalmic ointment, weakened with a double, or triple proportion of lard, is to be applied. If the stimulus of such local remedies should not disturb the work of nature, the ulcer gradually diminishes, and heals in the course of a fortnight.

The adhesion, which the projecting part of the iris contracts to the internal margin of the wound, or ulcer of the cornea, during the treatment, continues the same after the perfection of the external cicatrix, and of course during the rest of the patient's life. Hence, even after the most successful treatment of the prolapsus of the iris, the pupil remains a little inclined toward the place of the scar in the cornea, and of an oval figure. The change in the situation and shape of the pupil, however, causes little or no diminution of the patient's faculty of discerning distinctly the smallest objects; and is much less detrimental to the sight, than one, inexperienced in these matters, might conceive; provided the scar on the cornea be not too extensive, nor situated exactly in the centre of this membrane. In the first case, the sight is the less obstructed, as the pupil, which, on the first occurrence of the prolapsus, was narrow, oblong, and drawn considerably toward the wound, or ulcer, gradually enlarges, and forms a less contracted oval. As soon as the wound is completely healed, the pupil tends, in some degree, to occupy its former situation in the centre of the cornea; a fact, also noticed by Richter.

According to Scarpa, the recision of the protrusion with scissors can only be practised with success, when the iris has contracted a firm adhesion to the internal edge of the wound, or ulcer of the cornea; and, more especially, in that ancient prolapsus of the iris, in which the projecting portion of the iris has become with time almost insensible, hard, and callous, with its base strangulated between the edges of the wound, or ulcer of the cornea, and besides being adherent to them, having also a slender pedicle. Scarpa indeed has seen an incarcerated one fall off of itself.

In such circumstances, the recision of the old prolapsus of the iris is not attended with the least danger; for, after removing with a stroke of the scissors, that prominent portion of the iris, which has already contracted internal adhesions to the ulcerated margin of the cornea, so as to reduce it to a level with the external edges of the ulcer, there is no hazard of renewing the effusion of the aqueous humour, or giving an opportunity for another piece of the iris to be protruded. One or two applications of the argentum nitratum suffice afterward for the production of granulations on the ulcer of the cornea, and the formation of a cicatrix. But, it is not so in the treatment of the recent prolapsus of the iris, which has no adhesions to the internal edges of the wound, or ulcer of the cornea.

In four subjects recently affected with prolapsus of the iris, after Scarpa had removed, with a pair of convex-edged scissors, a portion of that membrane projecting beyond the cornea, of about the size of a fly's head, he found, on the ensuing day, that a new portion of the iris, not less than the first, had made its way through the ulcer of the cornea, and that the pupil was very much contracted, and drawn considerably further toward the ulcer of the cornea. These circumstances took place, notwithstanding the wound was touched immediately afterward with the argentum nitratum. Hence Scarpa apprehends, that if he were ever to divide such a little tumour again, it would reappear, and always with an additional protrusion of the iris, and a further distortion of the pupil. The advantage of caustic in the recent sensible prolapsus of the iris; and the use of scissors only in old callous cases, agree also with the directions given both by Beer and Mr. Travers. (*Lehre von den Augenkr. B.* 2, *p.* 68; *and Synopsis, p.* 280.)

There is a particular species of prolapsus, much less frequent, indeed, than that of the iris; but, which does occur, and, in Scarpa's opinion, is very improperly termed by modern oculists, "*prolapsus of the tunic of the aqueous humour.*" (*Janin, Pellier, Guérin, Gleize, &c.*) Neither do his sentiments upon this subject agree with those of Beer, whose explanation of the nature of the case is given in Vol. I. of this Dictionary. We shall there see, that it is a case, which he terms *ceratocele*, and which he thinks arises from a yielding of the inner layers of the cornea, in consequence of the outer ones not having united. And, in his second vol. p. 59, he has given a description of the same kind of disease from the support of the outer layers of the cornea being destroyed by ulceration. This is a point, on which the most experienced men differ so much, that it is difficult to reconcile their statements. Dr. Vetch seems to have full reliance upon the accuracy of the accounts of a protrusion of the membrane of the aqueous humour. (*Treatise on Diseases of the Eye, p.* 54, *&c.*) Mr. Travers inclines to Beer's view of the subject, and details reasons for doubting, that the vesicle is a distinct texture: "its appearance corresponds accurately to that of the innermost lamella of the cornea." (*Synopsis of the Diseases of the Eye, p.* 116.)

It is, says Scarpa, a transparent vesicle, filled with an aqueous fluid, and composed of a very delicate membrane, projecting from a wound, or ulcer of the cornea, much in the same way as the iris does under similar circumstances. Scarpa has several times seen this transparent vesicle full of water, elongating itself beyond the cornea, shortly after the operation for the extraction of the cataract, and sometimes, also, in consequence of an ulcer of the cornea, especially after rescinding a prolapsed portion of the iris.

The generality of oculists believe that this little transparent tumour consists of the delicate, elastic, diaphanous membrane, which invests the inner surface of the cornea, and is described by Descemet and Demours. "As soon as the membrane lining the cornea (they say) is exposed by the wound, or ulcer of the latter, and the delicate pellicle can no longer resist the impulse of the humours pressing behind it, it is necessitated to yield gradually, to become elongated, and to project from the wound, or ulcer of the cornea, exactly in the form of a pellucid vesicle." But, says Scarpa, how remote this theory is from the truth, must be manifest: 1. The delicate and elastic pellicle, described by Descemet and Demours, is not separable by any artifice from the inner surface of the cornea, except near where the cornea and sclerotica unite. Since these protruded vesicles make their appearance in practice at every point of the cornea, and even at its very centre, where the above pellicle is certainly neither separable, nor distinct from the compact texture of the cornea; it may at least be asserted, that the tunic of the aqueous humour does not in every instance constitute the transparent vesicle in question. 2. It is a well-known fact, that this vesicular, pellucid prolapsus happens more frequently after the extraction of the cataract, than any other occasion. In this case, since the tunic of the aqueous humour has certainly been divided to afford an exit to the crystalline, no one can be of opinion, that the transparent vesicle, which protrudes from the cornea after this operation, ought to be attributed to the distention and protrusion of the tunic of the aqueous humour. 3. If, in cases of ulcers of the cornea, the transparent vesicle should sometimes appear after the recision of the prolapsus of the iris, it is obvious, that if it consisted of the tunic of the aqueous humour, it ought invariably to appear before the prolapsus of the iris. 4. Should the surgeon remove the protruded vesicle to a level with the cornea by a stroke of the scissors, a small quantity of limpid water is seen to ooze out, at the moment when the incision is made, without any part of the aqueous humour escaping from the anterior chamber. This inconvenience would be inevitable, were the protruded vesicle in question formed by the delicate elastic pellicle, which is said to invest the inner surface of the cornea. Besides, the little transparent tumour disappears when the incision is made; but often another one exactly similar to what was cut off, is found in the very same place the following day. Had the little transparent tumour been composed of the tunic of the aqueous humour, elongated out of the wound, or ulcer of the cornea, it could not at all events have been reproduced at the same part of the cornea.

Actuated by such reflections, it is clear to Scarpa, that the pretended prolapsus of the tunic of the aqueous humour is not what it is imagined to be; but strictly speaking, only a forcible protrusion of a portion of the vitreous humour, which, from too much pressure being made on the eye, either at the time of the operation, or afterward, or from a spasm of the muscles of the eye, insinuates itself between the edges of the wound after the extraction of the cataract, and projects in the form of a transparent vesicle. The same thing also happens after ulcers of the cornea, whenever the aqueous humour has escaped, and a portion of the vitreous humour is urged by forcible pressure towards the ulcer facing the pupil; or whenever an elongated piece of the vitreous humour, after the recision of a prolapsed portion of the iris, passes by a shorter route than through the pupil, between the lips of the ulcer of the cornea. At length, we understand, why in both these instances a transparent vesicle forms, even after the recision of the tunic of the aqueous humour, or ulceration of the cornea; and why it very often reappears in the same place, though it has been cut away to a level with the cornea. It is because one or more cells of the vitreous humour, constituting the transparent vesicle, are succeeded after their removal by other cells of the same humour, which glide between the lips of the wound, or ulcer of the cornea, into the same situation.

The treatment of this species of prolapsus consists in removing the transparent vesicle, projecting from the wound, or ulcer, by means of a pair of curved scissors with convex edges, and bringing the edges of the wound of the cornea immediately afterward into perfect apposition, in order that they may unite together as exactly as possible. But when there is an ulcer of the cornea, as soon as the vesicle is removed, the sore must be touched with the argentum nitratum, so that the eschar may resist any new prolapsus of the vitreous humour, and at the same time dispose the ulcer of the cornea to granulate and heal.

If, in some particular cases, the vesicle should not project sufficiently from the wound, or ulcer of the cornea, to be included in the scissors, the same object may be accomplished by puncturing the tumour with a lancet, or couching-needle; for when the limpid fluid which it contains is discharged, the membrane forming it shrinks within the edges of the wound, or ulcer of the cornea, and no longer hinders the union of the former, or the cicatrization of the latter.

Should the transparent tumour reappear in the same situation, the day after its recision, or puncture, it is right to repeat one of these operations, and to adopt further measures for maintaining the edges of the wound of the cornea in contact; or if it should be an ulcer, the eschar must be made to adhere more deeply to its bottom and sides, so as to form a greater obstacle to the escape of the vitreous humour. In these circumstances, the surgeon must take all possible care to obviate such causes as have a tendency to propel the vitreous humour towards the wound, or ulcer of the cornea; particularly too much pressure on the eyelids, spasms of the muscles of the eye, coughing, sneezing, efforts at stool, and other similar ones; and care must also be taken to check the progress of inflammation.

The choroid coat is, likewise not exempt from prolapsus. Scarpa has seen this complaint in M. Bressanini, an apothecary at Bescape. A small abscess, formed between the sclerotica and choroid coats, at the distance of two lines from the union of the cornea with the sclerotica, in the inferior hemisphere of the globe of the eye, in consequence of a severe internal and external ophthalmy, which had been treated in its incipient state, with repellent remedies. The abscess burst, and discharged a small quantity of thick viscid lymph; then a small blackish body, composed of the choroid coat, presented itself on the outside of the little ulcer of the sclerotica. The treatment consisted in applying the argentum nitratum several times to the projecting portion of the choroides, until it was consumed, and reduced to a level with the bottom of the ulcer of the cornea. The part then healed. The eye remained, however, considerably weakened, and the pupil afterward became nearly closed. *Scarpa sulle Principali Malattie degli Occhi. Venezia*, 1802. *Richter's Anfangsgründe der Wundarzneykunst, B.* 3, *Von dem Vorfalle der Regenbogenhaut. Pellier, Obs. sur l'Œil, p.* 350. *G. J. Beer, Lehre von den Augenkrankheiten, B.* 1, § 402, 518, *and* 592, *and B.* 2, § 58, 62, *&c. 8vo. Wien.* 1813—1817. *J. Wardrop, Essays on the Morbid Anatomy of the Human Eye, Vol.* 2, *p.* 51, *8vo. Lond.* 1818. *J. Vetch, A Practical Treatise on the Diseases of the Eye, p.* 53, *&c. Lond. 8vo.* 1820. *B. Travers, A Synopsis of the Diseases of the Eye, p.* 116, 280, *&c. 8vo. Lond.* 1820. *Weller on Diseases of the Eye, Transl. by Dr. Monteath, 8vo. Glasgow,* 1821.

For a description of the manner of dividing the iris, in order to make an artificial pupil, when the natural one is closed, refer to *Pupil, Closure of.*

Iris, *Effects of certain narcotics upon,* see Belladonna and Cataract. The following work upon the subject also merits attention. *C. Himly de la Paralysie de l'Iris par une application locale de la Jusquiaume, et de son utilité dans le traitement de plusieurs maladies des Yeux,* 2de *Ed.* 12*mo. Altona,* 1805.

IRITIS. Inflammation of the iris. See Ophthalmy.

ISCHU'RIA. (From *ισχω,* to restrain; and *ουρον,* the urine.) A suppression, or stoppage of the urine.

The distinction between a *suppression* and *retention* of urine, is practical and judicious. The former most properly points out a defect in the secretion of the kidneys; the latter, an inability of expelling the urine when secreted. (*Hey.*)

The first disease is not very common, is named *ischuria rénalis,* or *suppression of urine,* and belongs to the province of the physician; the second is an exceedingly frequent disorder, is named *ischuria vesicalis,* or *retention of urine,* and its treatment is altogether surgical. Every thing relative to it will be found in the articles *Catheter,* and *Urine, Retention of.*

ISSUE signifies an ulcer, made designedly by the practitioner, and kept open a certain time, or even the patient's whole life, for the cure, or prevention, of a variety of diseases.

The physician, in his practice, has frequent occasion to recommend the making of an issue, and the surgeon finds it a principal means of relief in several important cases, as, for instance, the white swelling, the disease of the hip-joint, caries of the vertebræ, &c. Many persons are never in health, or, at least, fancy themselves always ill, unless they have an issue formed in some part of their body or another. The making of an issue, indeed, is not unfrequently considered as an imitation of nature, who, of her own accord, often forms ulcers and abscesses in various parts of the body (as is not uncommonly conjectured) for the purpose of discharging pernicious humours, whereby people are supposed to be freed from grievous disorders, and have their health preserved. The humoral pathologists were excessively partial to these notions, which, at the present time, will be found by every experienced practitioner to influence the mass of mankind, and render the formation of issues more common, than perhaps is consistent with the better established principles of medical science. Few old subjects will allow a sore of long standing to be dried up (as the expression is,) without requiring the surgeon immediately afterward to make an issue for them. When an ulcer has existed a great length of time, the constitution may possibly become so habituated to it, that the health may really suffer from its being healed. "I have often (says the experienced Dr. Parry) seen various thoracic affections, as pulmonary consumption, asthma, carditis, or hydrothorax, arise from the spontaneous, or artificial cure of ulcers, perpetual blisters, or fistulæ." (*Elements of Pathology, &c. p.* 386.) Asthmatic complaints, severe headachs, &c. are frequently observed to follow the cicatrization of an old ulcer; but whether they would have happened, if an issue had been made in time, is a question difficult of positive determination; for many persons with old ulcers are not prevented from suffering from asthma and headach. The plan of making an issue, however, is commendable both as rational and exempt from danger. Whatever may be the solidity of the theories, which have been offered by medical writers, in regard to issues, the practitioner, who has his eyes open, cannot fail to see the benefit often derived from such means; and if there be any unquestionable facts in medicine and surgery, we may confidently set down among them the frequent possibility of relieving one disease by exciting another of a less grievous, and more curable nature.

There are two ways of making an issue; one is with a lancet, or scalpel; the other, with caustic.

The place for the issue being fixed upon, the surgeon and his assistant are to pinch up a fold of the integuments, and with a lancet or knife, make in them an incision of sufficient size to hold a pea, or as many peas as may be thought proper. The pea, or peas are then to be placed in the cut, and covered with a piece of adhesive plaster, a compress, and bandage. The peas first inserted, need not be removed for three or four days, when suppuration will have begun; but the issue is afterward to be cleaned and dressed every day, and have fresh peas put into it. The preceding is the ordinary method of making such issues as are intended to contain only one or two peas.

When the issue is to be larger, which is generally proper, in cases of diseased vertebræ, white swellings, &c., the best plan is to destroy a portion of the integuments with caustic. The caustic potassa, blended with quicklime, is mostly preferred for this purpose. The situation and size of the issue having been determined, the surgeon is to take care that the caustic does not extend its action to the surrounding parts. With this view, he is to take a piece of adhesive plaster, and having cut a hole in it of the exact shape and size of the issue intended to be made, he is to apply it to the part. Thus the plaster will defend the adjacent skin from the effects of the caustic, while the uncovered portion of integuments, corresponding to the hole in the plaster, is that which is to be destroyed. The caustic is to be taken hold of with a bit of lint, or tow, and its end, having been a little moistened with water, is to be steadily rubbed upon the part of the skin where the issue is to be formed. The frictions are to be continued till the whole surface, intended to be destroyed, assumes a darkish corroded appearance. The caustic matter may now be carefully washed off with some wet tow. The plaster is to be removed, and a linseed poultice applied. As soon as the eschar is detached, or any part of it is loose enough to be cut away without pain, or bleeding, the peas are to be inserted and confined in their proper place with a piece of adhesive plaster. Some use beans for the purpose; others, beads, which answer very well, and have the advantage of serving for any length of time, when washed and cleaned every day. If the issue is at all of a longitudinal shape, the peas, beans, or beads, may be more easily kept in their places, when a thread is passed through them.

Issues ought always to be made, if possible, in a situation, where the peas will not be much disturbed in the ordinary motions of the body, nor interfere with the actions of muscles. The interspaces between the margins and insertions of muscles, are deemed the most eligible places. Thus, issues in the arm are usually made just at the inferior angle of the deltoid muscle, by the side of the external edge of the biceps. In the lower extremities, issues are often made at the inner side of the thigh, immediately above the knee, in a cavity that may be readily felt there with the fingers. Sometimes, issues are made upon the inside of the leg, just below the knee. For the relief of any affections of the head or eye, the nape of the neck is commonly selected as a good situation. In caries of the vertebræ, they are made on each side of the spinous processes. In cases of diseased hips, they are formed in a depression just behind and below the trochanter major. When the nature af the disorder does not particularly indicate the situation for the issue, the arm should be preferred to the leg, as issues upon the upper extremities, especially the left arm, are much less annoying, than upon either of the lower limbs.

The great art of keeping an issue open, for a long while, consists in maintaining an equal and effectual pressure upon the peas, by which means, they are confined in their places, little depressions are made for them, and the granulations hindered from rising. Compresses of pasteboard and sheet-lead will often be found highly useful. This plan is the surest one of preventing the issue from healing, and the most likely to save the patient all the severe and repeated suffering, which the fresh application of the caustic, or the use of stimulating powders, in order to renew the sore and repress the fungous flesh, unavoidably occasions.

There is a method of making issues with the caustic made into a sort of paste, which is laid upon the part left uncovered by the adhesive plaster. It seems to me to be a more tedious and painful plan, and I do not recommend it.

It has been suspected, that the pain, arising from the caustic, might be lessened, by mixing opium with the application; but, the idea seems not at all probable; the destruction of a part of the skin must inevitably cause considerable pain, with whatever substance it is produced, and opium itself, so far from being likely to diminish the agony, is itself a violent stimulus, whenever it comes into contact with the exposed extremities of the nerves.

J.

JOINTS, DISEASES OF. The joints are subject to numerous diseases, which are more or less dangerous, according to their particular nature. Like all other parts, the joints are liable to inflammation and abscesses; their capsules frequently become distended with an aqueous secretion, and the disease termed *hydrops articuli* is produced; but, the most important of all their morbid affections, are the cases, which, a few years ago, were indiscriminately called *white swellings*, *scrophulous joints*, and the *disease of the hip-joint*. Here, as Mr. Brodie remarks, the same name has been frequently applied to different diseases, and the same disease has received different appellations. And confusion, with respect to the diagnosis, always gives rise to a corresponding confusion, with respect to the employment of remedies. Although, says he, diseases in their advanced stage extend to all the dissimilar parts, of which the joints are composed, such is not the case in the beginning. Here, as elsewhere, the morbid actions commence, sometimes in one, and sometimes in another texture, differing in their nature, and, of course, requiring to be differently treated, according to the mechanical organization, and vital properties of the part, in which they originate. (See *Pathological and Surgical Obs. on Diseases of the Joints, p.* 2, *8vo Lond.* 1818.) It was this idea, which led Mr. Brodie to trace by dissection the exact parts, in which several of the principal diseases of the joints commence, and how much light and discrimination his successful investigations have produced, it is needless for me here to insist upon, as his merit will long be appreciated by every surgeon, who recollects the perplexity and ignorance which prevailed only a few years ago in this very interesting branch of surgery.

Wounds.—By the wound of a joint, surgeons mean a case, where the capsular ligament is penetrated, or divided. The injury is often accompanied with a division of the lateral, or other ligaments, and sometimes also with that of the cartilages and bones. That the capsular ligament is wounded may generally be learned by the introduction of a probe, and frequently by a discharge of a transparent viscid fluid, called the synovia. But, as a similar discharge may proceed from mere wounds of the bursæ mucosæ, we might form an erroneous judgment, were we unacquainted with the situation of these little membranous bags. Boyer has seen several cases, in which a fluid, resembling synovia, was discharged from wounds of the sheaths of tendons. (See *Traité des Maladies Chirurg. T.* 4, *p.* 408.) Here, the advice which I have given in another place, (See *Wounds of the Abdomen*,) respecting the temerity of being too officious with the probe, is equally important, inasmuch as the rough introduction of this instrument into a large joint, like the knee, would be very likely to excite inflammation of the synovial membrane, and a train of dangerous and even fatal consequences; while the information, gained by such employment of the probe, is of little use; because, whenever a wound is suspected to reach into the capsular ligament, exactly the same treatment should always be followed, as as if the joint were positively known to be penetrated.

Notwithstanding simple wounds even of large joints often heal favourably, without any bad symptoms, this is not constantly the case, and the records of surgery furnish many examples, in which the most alarming and fatal consequences ensued. (See *Hunter's Commentaries, Part,* 1, *p.* 69.) When properly treated, punctured wounds of the joints (says Boyer) are not in general attended with danger; but, as some of these wounds, which were apparently quite simple, have been followed by very bad symptoms, and even death, we should always be extremely circumspect in the prognosis. (See *Traité des Mal. Chir. T.* 4, *p.* 409.) The treatment consists in endeavouring to heal the injury by the first intention; in applying cold lotions; forbidding all motion of the part; and employing bleeding and other antiphlogistic remedies.

Baron Boyer relates two cases of punctured wounds of the elbow joint, which healed up in a few days, without any unfavourable symptom. He acknowledges, however, that these accidents do not always go on so well, and that the consequences are sometimes perilous.

Simple incised wounds present only one indication; viz. that of healing the part by the first intention. At the moment of the accident, some of the synovia is discharged, indicating that the capsular ligament is wounded. Should this circumstance not have been noticed at first, the surgeon may see the synovia flow out again, if he move, or press upon the joint. But, in making this examination, the greatest gentleness should be used, lest the irritation of the capsular ligament be increased. When the wound is large, and there is no considerable thickness of soft parts, the articular surfaces are exposed to view.

The prognosis of an incised wound of a joint is not generally unfavourable, when the edges have been immediately brought together, the cavity of the joint has not been long exposed, and blood is not extravasated in it. This last danger is also exaggerated, as will be noticed, in speaking of collections of blood in joints. With these exceptions, says Boyer, the wound may heal as readily, as if the joint were not opened, and he has cited several facts in proof of this statement. Its truth is also confirmed by the success which attends operations, practised for the purpose of extracting cartilaginous substances from the knee. Nay, very bad cases sometimes recover under judicious management, even though the joint be large, and abscesses follow. Thus I have seen in St. Bartholomew's hospital within the last year (1820) two examples of compound fractures of the patella, where the opening in the capsule was so large, that the finger could readily be passed into the cavity of the joint, yet after large abscesses, a great deal of fever, and separation of bone, the patients recovered with stiff joints. But, I would advise surgeons not to let any facts of this kind prejudice their judgment in the treatment of gunshot wounds of the large joints, where, in the circumstances elsewhere explained (see *Amputation* and *Gunshot Wounds*) amputation is the safest practice. In a sabre, or cut wound, the principal object is to heal the wound by the first intention. The rest of the treatment consists in using every possible means for the prevention of inflammation, by perfect quietude of the part; the use of cold applications, &c.

We repeat, however, that wounds of the joints do not always heal in the above favourable manner. Even among those cases, which appear the most slight and simple, there are but too many, which are followed by such aggravated symptoms, as either prove fatal, or occasion a necessity for amputation. And, in other instances of a less grievous description, when the patient is cured, the termination of danger is not without an anchylosis, by which the motion and functions of the joint are permanently destroyed.

The experienced Mr. Hey has noticed wounds of the joints, and made some pertinent remarks on the subject. He states, that in these cases, the utmost care should be taken to *prevent* inflammation. "Upon this circumstance chiefly depends a successful termination. I have seen (says he) many large wounds of the great joints healed without the supervention of any dangerous symptoms, where due care has been taken to prevent inflammation; whilst injuries, apparently trifling, will often be followed by a train of distressing and dangerous consequences, where such care has been neglected. It is, generally, easier to prevent inflammation in the joints, after a wound, than to arrest its progress when once begun. I speak now of inflammation affecting the capsular ligament. A slight degree of redness and tenderness in the integuments only is of little consequence; but, when the capsular ligament becomes inflamed, the formation of abscesses attended with a high degree of fever, and ultimately a stiffness of the joint, are the common consequences, if the life of the patient is preserved." (See *Hey's Practical Observations in Surgery, p.* 354, *Edit.* 2.)

For facts, in confirmation of the foregoing account, I particularly refer the reader to several cases recorded in this last publication, *p.* 355, *et seq.* and by *Boyer.* (*Traité des Mal. Chir. T.* 4, *p.* 426, *&c.*)

When the large joints, particularly the knee, are wounded, the stomach is frequently very much affected. I remember being shown by Mr. Best of Newbury, a man, who, in his occupation as a wheelwright, happened to give himself a wound by which one side of the knee was laid open: a good deal of inflammation and suppuration ensued; but, what particularly struck me, was the manner in which the man complained of the affection of his stomach.

In speaking of cartilaginous substances in the joints, I shall have occasion to advert again to the danger attendant on wounds of these parts; and the same fact is still further considered, in the articles *Amputation*, *Dislocations*, *Fractures*, and *Gunshot Wounds*, in which last part of the Dictionary, the sentiments of Baron Larrey, and other writers on military surgery, are laid before the reader.

Inflammation of Joints, if we exclude from consideration specific cases, may be said usually to be the consequence of a contusion, sprain, wound, or some other kind of injury: but with respect to the inflammation of the synovial membrane, as described by Mr. Brodie, no cause is so frequent, as the application of cold, and hence he explains the frequency of this disease in the knee, and its rarity in the hip and shoulder, which are covered with a thick mass of flesh. As a late writer observes, the inflammation, arising from a wound, is infinitely the most severe after it has once commenced. (*James on Inflammation, p.* 157.)

The inflamed joint shows the common symptoms of inflammation; viz. preternatural redness, increased heat, throbbing, pain, and swelling, while the constitution is also disturbed by the common symptoms of inflammatory fever. It deserves notice, however, that in these cases, the constitutional symptoms are often exceedingly severe, and the pulse is more frequent, and less full and strong, than when parts, more disposed to return to a state of health, are affected. The inflammation first attacks some part of the capsular ligament, and very quickly spreads over its whole extent, as usually happens in all inflammations of smooth serous membranes.

The capsules of the joints are naturally not very sensible; but, like many other parts similarly circumstanced, they often become acutely painful, when inflamed. The complaint is accompanied with an increased secretion of the synovia, which becomes of a more aqueous, and of a less albuminous quality, than it is in the healthy state. Hence, it is not so well calculated for lubricating the articular surfaces, and preventing the effects of friction, as it is in the natural condition of the joint; a circumstance, which may explain, why a grating sensation is often perceived on making the patella.

The capsular ligaments, like other parts, are frequently thickened by inflammation, and sometimes, coagulating lymph being effused on their internal surfaces, organized cartilaginous, or osseous bodies, are formed within the joints.

It has been explained by Mr. Brodie, that the usual consequences of inflammation of the synovial membrane, or capsular ligament, are; 1. a preternatural secretion of synovia, 2. an effusion of coagulating lymph into the cavity of the joint. 3. a thickening of the synovial membrane, a conversion of it into a substance resembling gristle, and an effusion of coagulable lymph, and probably of serum into the cellular structure, by which it is connected with the external parts. The same gentleman has seen several cases, where, from the appearance of the joint, and the symptoms, there was every reason to believe, that the inflammation had produced adhesions of the reflected fold of the membrane to each other: and, in dissection, he has occasionally observed adhesions which might have arisen from inflammation at some former period. "These effects of inflammation of the synovial, very much resemble those of inflammation of the serous membranes. There are, however, some points of difference. In the former, I have reason to believe, that suppuration rarely takes place independently of ulceration; but, this is a frequent occurrence in the latter. Inflammation of the peritonæum, or pleura, though very slight in degree, and of very short duration, terminates in the effusion of coagulable lymph; but it is only violent or long-continued inflammation, which has this termination in the membranes of joints. (*Brodie in Med. Chir. Trans. Vol.* 4, *p.* 216.)

When the inflammation attains a high pitch, an abscess may occur in the capsular ligament, which at length ulcerates, and the pus makes its way beneath the skin, and is, sooner or later, discharged through ulcerated openings.

An abscess rarely takes place in an important articulation, in consequence of acute inflammation, without the system being also so deranged that life itself is imminently endangered. Severe febrile symptoms always afflict the patient, and occasionally, delirium and coma taking place, death itself ensues. Two rapidly fatal cases of ulceration of the synovial membrane, where matter had formed within it from a sprain of the hip, and a contusion of the shoulder, are recorded by Mr. Brodie. (See *Pathol. Chir. Obs. p.* 65.)

In these cases, the inflammatory fever is very quickly converted into the hectic; indeed, when an abscess has taken place in a large joint, in consequence of acute inflammation, hectic symptoms almost immediately begin to show themselves, and the strong actions of the common inflammatory fever suddenly subside.

Local consequences, even worse than those above described, may follow inflammation of a joint. As the layer of the capsular ligament, reflected over the cartilages of the articulation, is often inflamed, the cartilages themselves may have the inflammation communicated to them. Parts of a cartilaginous structure, being very incapable of bearing the irritation of disease, often ulcerate, or, in other words, are absorbed, so as to leave a portion, or the whole, of the articular surface of the bones, completely denuded of its natural covering. At length the heads of the bones themselves inflame, and become carious; or the consequence may be anchylosis. Mr. Brodie has seen some cases in which there was extensive destruction of the cartilages, apparently in consequence of neglected inflammation of the synovial membrane; but he believes, that in most cases where ulceration of the cartilage is combined with such inflammation, the former is the primary affection, and the latter takes place subsequently, in consequence of the formation of an abscess within the joint. (*Pathol. and Surg. Obs. &c. p.* 17.) According to Mr. Brodie, who speaks chiefly of the inflammation which begins in the synovial membrane itself, and is not communicated to it from other textures, the disease very seldom attacks young children, but is frequent in adult persons, the reverse of what happens in some other diseases of the joints.

The inflammation of the capsular ligament, or synovial membrane, frequently assumes the chronic form, and is then very often confounded with other more serious maladies, under the general appellation of white swelling. The disease often arises from cold, and hence is more common in the knee and ankle than in the hip or shoulder. It may also arise from the immoderate use of mercury, and, in particular constitutions, from rheumatism and general debility of the system. In these instances it often leaves one joint and attacks another; and it is less severe, and less disposed to produce effusion of coagulating lymph, or a thickened state of the membrane, than when it is apparently a local disease. (*Brodie, in Med. Chir. Trans. Vol.* 4. *p.* 218.) In the latter case the disorder is more likely to assume a severe character, and may be of long duration, leaving the joint with its functions more or less impaired, and occasionally terminating in its total destruction. The following are the chief symptoms of the complaint, pointed out by Mr. Brodie. At first, although some pain is felt over the whole joint, the patient refers it principally to one spot, and it is not at its height before the end of a week or ten days. Sometimes, even at this period, the pain is trifling, but sometimes it is considerable, and every motion of the joint is distressing. In a day or two after the commencement of the pain, the joint is affected with swelling, which at first arises entirely from a collection of fluid in its cavity, and, in the superficial joints, an undulation may be distinguished. However, after the inflammation has prevailed some time, the fluid is rendered less perceptible, either in consequence of the synovial membrane being thickened, or the effusion of lymph; and the more solid the swelling is, the more is the mobility of the joint impaired. The form of the diseased joint does not correspond to that of the heads of the bones; but, as the swelling is chiefly caused by the distention of the synovial membrane, "its figure depends in a great measure on the situation of the ligaments and tendons, which resist it in certain directions, and allow it to take place in others. Thus, when the knee is affected, the swelling is principally observable on the anterior and lower part of the thigh," where there is only a yielding cellular structure between the extensor muscles and the bone. "It is also often considerable in the spaces, between the ligament of the patella and the lateral ligaments, because at these points the fatty substance is propelled outward by the collection of fluid. In the elbow, the swelling occurs principally above the olecranon, under the extensor muscles of the forearm; and in the ankle, it is between the lateral ligaments and the tendons in front of the joint. In the hip and shoulder, where the disease is less frequent, the fluid cannot be felt, but the swelling is perceptible through the muscles. In the beginning of this disease in the hip, a fulness both in the groin and nates may be remarked; but afterward the nates become flattened, and the glutæi wasted from want of use. The pain is usually confined to the hip, but Mr. Brodie has seen cases in which it was also referred to the knee. It may be discriminated from the case in which the cartilages of the hip are ulcerated, by observing, that *the pain is more severe in the beginning than in the advanced stage of the disease;* it never amounts to the excruciating sensation felt in the other disease; and it is aggravated by motion, but not by pressing the cartilaginous surfaces against each other. The wasting of the glutæi is also preceded by a fulness of the nates. After the inflammation has subsided, the fluid is absorbed, and the joint frequently regains its natural figure and mobility; but, in the majority of cases, stiffness and swelling remain, and the patient continues very liable to relapse, the pain returning, and the swelling being augmented, whenever the patient exposes himself to cold, or exercises the limb a great deal. In cases where the synovial membrane is thickened, a slow kind of inflammation sometimes continues in the part, notwithstanding the fluid has been absorbed, and the principal swelling has subsided, the disease at length extending to the cartilages, suppuration taking place, and the articular surfaces being completely destroyed. According to Mr. Brodie, in this advanced stage, the history of the disease, and not its present appearance, is the only thing by which one can learn whether the primary affection was inflammation of the synovial membrane, or ulceration of the cartilages. Though such is the most common character of inflammation of the synovial membrane, it is admitted, that its nature is sometimes more acute, exhibiting the symptoms mentioned at the beginning of this section. (See *Brodie's Pathol. and Surg. Obs. p.* 21, *&c.*) It is remarked by Mr. Wilson, that, when coagulable lymph is effused, the whole of it does not always adhere to the inflamed surface, but some of it forms flakes which float in the fluid within the joint in masses large enough to be sometimes felt through the capsular ligament. In other instances, the lymph becomes solid, adheres to the inside of the synovial membrane, and becomes vascular. The surface of this adventitious coating is sometimes smooth; but, occasionally, it forms thick projecting masses, of different degrees of thickness and length, and so numerous as to conceal every part of the original smooth surface of the synovial membrane, as exemplified in a preparation in Windmill-street. (*On the Skeleton and Diseases of Bones and Joints, p.* 319.)

When inflammation of the synovial membrane has arisen from a protracted or ill-conducted course of mercury, Mr. Brodie recommends a trial of sarsaparilla; and when the disorder is connected with rheumatism, the medicines advised are opium with diaphoretics, preparations of colchicum autumnale, and other usual remedies for rheumatic complaints. In some instances, however, in which several joints were affected, this gentleman has known benefit derived from moderate doses of mercury, (*p.* 31.) But whether the disease be local, or dependent on the state of the constitution, Mr. Brodie considers topical remedies of most importance.

It will considerably shorten what we have to say concerning the treatment of inflamed joints, to observe, that, in the acute form of inflammation of the synovial membrane, the antiphlogistic plan, in the full sense of the expression, is to be strictly adopted. But, as there is a variety of means often adapted to the same purpose, it seems necessary to offer a few remarks on those which lay the greatest claim to our commendations.

There are few other surgical cases in which general, and especially topical, bleeding is more strongly indicated. The violence of the inflammation, and the strength, age, and pulse of the patient, must determine with regard to the use of the lancet; but the application of leeches may be said to be invariably proper. When the leeches fall off, the bleeding is to be promoted by fomenting the part. The surgeon should daily persist in this practice, until the acute stage of the inflammation has subsided. As Mr. Brodie observes, attention should also be paid to the state of the bowels, and saline draughts and diaphoretic medicines be exhibited. (*Pathol. and Surgical Obs. p.* 32.) In conjunction with this treatment, the lotio plumbi acetatis must be employed.

In a few instances, however, the patient seems to derive more ease and benefit from the employment of fomentations and emollient poultices, which, according to Mr. Brodie, is the case when the swelling has been produced rapidly, and is attended with considerable tension. But, on this point, as I have remarked in speaking of *Inflammation*, the feelings of the afflicted should always be consulted; for, if the pain be materially alleviated by this or that application, its employment will hardly ever be wrong.

Nothing more need be said concerning the rest of the treatment, proper during the vehemence of the inflammation, as the duty of the surgeon is not materially different from what it is in other inflammatory cases.

As soon as the acute stage of the affection has subsided, the grand object is to remove the effects which have been left. These are a thickened state of the capsular ligament, and parts surrounding the articulation; a stiffness of the joint, and pain when it is moved; fluid in the capsule, &c.

At first, as Mr. Brodie has observed, the joint should be kept perfectly quiet, and blood should be several times taken from the part, by means of leeches and cupping. The latter is the method to which the preceding writer expresses the preference. The use of cold evaporating lotions is also to be continued until the inflammation has further abated, when a blister may be applied, and kept open with the savin cerate, or a repetition of blisters kept up, as preferred by Mr. Brodie. "The blisters (he says) should be of considerable size; and if the joint be deep-seated, they may be applied as near to it as possible; but, otherwise, at a little distance. Thus, when the synovial membrane of the hip is affected, they may be placed on the groin and nates; but, when that of the wrist is inflamed, they should be applied to the lower part of the forearm. Mr. Brodie thinks blisters have more effect than any other means, in removing the swelling; but, excepting in very slight cases, he very rightly condemns their use, unpreceded by the abstraction of blood. After the subsidence of the inflammation, moderate exercise of the joint, and stimulating liniments are recommended. The camphor liniment is to be strengthened with the addition of liquor ammoniæ. or tinctura lyttæ, or the following formula, adopted as that to which the above gentleman seems to give the preference. ℞. Olei olivæ ℥iss. acid. sulph. ʒss. M. He speaks also favourably of the effects of the antimonial ointment, in the proportion of ʒj. of the antim. tart. to ℥j. ung. cetacei. Plasters of gum ammoniac he regards as sometimes useful in preventing relapsus. Issues and setons are never serviceable, unless ulceration of the cartilages has begun. For the removal of the remains of the swelling and stiffness, Mr. Brodie joins other writers in praising the efficacy of friction and exercise. The friction may be made with camphorated mercurial ointment, or with powdered starch; but the friction is to be employed with caution, as otherwise it may produce a return of the inflammation. When this happens, it is to be discontinued, and blood taken from the part. On the whole, Mr. Brodie appears to consider friction better adopted to cases, where the stiffness depends upon the state of the external parts, than in others, where it arises from disease in the joint itself. With respect to the plan of allowing a column of warm water to fall on the part, as suggested by Le Dran, and practised at the watering-places, he allows, that it is beneficial, but that it requires the same caution as the employment of friction. (*Pathol. and Surg. Obs. p.*30, *&c.*) I have met with several instances, in which lotions, composed of vinegar and muriate of ammonia, sufficed for the removal of the chronic complaints, left after the acute stage of the disorder.

The severity of the constitutional symptoms is mostly, if not always, greater, when the inflammation of a large joint arises from a wound, than when it is the consequence of a bruise or sprain.

Loose cartilages in joints.—Hard, roundish, or flattened bodies, mostly of a cartilaginous nature, are sometimes formed within the capsular ligaments, occasioning more or less pain in the affected joints, and a considerable impediment to the freedom of their movements. The disorder, though not noticed by any of the very ancient writers, is far from being uncommon. Paré is the first who speaks of it: he says, that *a hard, polished, white body, of the size of an almond,* was discharged from the knee of a patient, in the year 1558, in which he had made an incision for an *aqueous apostume,* (without doubt an hydrops articuli.) (*Liv.* 25, *chap.* 15, *p.* 772.) A hundred and thirty-three years afterward, viz. in 1691, Pechlin published the full details of another case, in which a cartilaginous body was successfully extracted from the knee. (*Observat. Physico-Med. Obs.* 38, *p.* 306.) Dr. Alexander Monro in 1726, dissected the knee-joint of a woman, who had been hung, and found in the articulation a cartilaginous body, of the shape and size of a small bean. These were the only examples of the disease known before the year 1736, at which period Mr. Simson cut out of the knee a similar substance, which he supposed at the time of the operation was only beneath the skin. (See *Edinb. Med Essays, Vol.* 4.)

Since the publication of this last case, the disease has been several times met with in England by Bromfield, Hewit, Middleton, Gooch, Ford, Home, Bell, Abernethy, &c.; in Germany, by Henckel, Theden, Loeffler, &c.; and in France by Desault, Sabatier, and many other practitioners. Hence, as Boyer remarks, this disorder is now as well known, as most others, to which the joints are subject. (*Traité des Mal. Chir. T.* 4, *p.* 434.)

Such detached and moveable cartilages are not peculiar to the knee, as they occur in other joints; yet they are most frequently met with in the knee, and it is in this joint that they produce symptoms, which render them the object of a chirurgical operation. Morgagni and B. Bell met with them in the ankle; Haller in the joint of the jaw; and Hey in the elbow.

According to Sir Everard Home, these substances are analogous in their structure to bone; but in their external appearance, they bear a greater resemblance to cartilage. They are not, however, always exactly of the same structure, being in some instances softer than in others. Their external surface is smooth and polished, and, being lubricated by the synovia, allows them to be moved readily from one part of the joint to another. They seldom remain long at rest, while the limb is in motion; and when they happen to be in situations where they are pressed upon with force by the different parts of the joint, they occasion considerable pain, and materially interfere with its necessary motions.

The circumstance of their being loose, and having no visible attachment, made it difficult to offer good conjectures respecting their formation; and, according to Sir E. Home, no satisfactory account of their origin had been given, when Mr. Hunter made his observations. In the course of his experiments, instituted with a view to establish a living principle in the blood, Mr. Hunter was naturally induced to attend to the phenomena, which took place, when that fluid was extravasated, whether in consequence of accidental violence, or other circumstances. The first change he found to be coagulation; and the coagulum thus formed, if in contact with living parts, did not produce an irritation similar to extraneous matter, nor was it absorbed and taken back into the constitution, but in many instances preserved its living principle, and became vascular, receiving branches from the neighbouring blood-vessels for its support; it afterward underwent changes, rendering it similar to the parts to which it was attached, and which supplied it with nourishment. When a coagulum adhered to a surface, which varied its position, the attachment was rendered in some instances pendulous, and in others it was entirely broken.

Hence, it was easy to explain the mode, in which those pendulous bodies are formed, which are sometimes attached to the inside of circumscribed cavities, and the principle being established, it became equally easy for Mr. Hunter, to apply it under other circumstances, since it is evident from a known law in the animal economy, that extravasated blood, when rendered an organized part of the body, can assume the nature of the parts into which it is effused, and consequently, the same coagulum, which, in another situation might form a soft tumour, would when situated on a bone, or in the neighbourhood of bone, often form a hard one. The cartilages, found in the knee-joint, therefore, appeared to him to originate from a deposit of coagulated blood, upon the end of one of the bones, which had acquired the nature of cartilage, and had afterward been separated. This opinion was further confirmed by the examination of joints which had been violently strained, or otherwise injured, where the patients had died at different periods after the accident. In some of these cases, there were small projecting parts, preternaturally formed, as hard as cartilage, and so situated, as to be readily knocked off by any sudden or violent motion of the joint. (*Trans. for the*

Improvement of Med. and Chir. Knowledge, Vol. 1.)

Mr. Brodie met with two cases, however, in which the loose bodies were of a different nature, and had a different origin from that referred to by Sir. E. Home. Sometimes disease causes a bony ridge to be formed, like a small exostosis, round the margin of the cartilaginous surfaces of the joint. In the two examples alluded to, this preternatural growth of bone had taken place, and in consequence of the motion of the parts, portions of it had been broken off, and lay loose in the cavity of the joint. (*Brodie in Med. and Chir. Trans. Vol.* 4. *p.* 276.) And, in a more recent publication, he remarks, that, in the majority of cases, which he has met with, no inflammation preceded the formation of these preternatural substances, and, therefore, he thinks it probable, that, in some instances, they are generated, like other tumours, by some different process. He further observes, that they appear to be situated originally either on the external surface or in the substance of the synovial membrane, since, before they become detached, a thin layer of the latter may be traced over them. (*Pathological and Surgical Obs. p.* 298.)

One or more of these preternatural bodies may be formed in the same joint. Sir E. Home mentions one instance, in which there were three; they are commonly about the size of a horsebean, often much smaller, and sometimes considerably larger; when very large, they do not give so much trouble to the patient as the smaller kind. A soldier of the 56th regiment had one nearly as big as the patella, which occasioned little uneasiness, being too large to insinuate itself into the moving parts of the joint. Morgagni saw twenty-five in the left knee of an old woman, who died of apoplexy; and Haller met with no less than twenty in the articulation of the lower jaw. When there are several in the same joint, it is observed, that their size is generally small. (*Boyer, Traité des Mal. Chir. T.* 4, *p.* 436.)

The diagnosis of this disease, as Boyer observes, is seldom attended with any difficulty. When the formation of the extraneous substances follows a fall, or blow upon the joint, the complaint begins with a swelling of the surrounding soft parts, and upon the subsidence of this swelling, which lasts for a time more or less long, the presence of the little cartilaginous tumours is indicated by certain symptoms which are peculiar to them. In persons who have had no blow, nor fall upon the knee, the disease sometimes commences with a more or less acute pain in the joint, with or without swelling of the surrounding soft parts, and which affection is usually regarded as rheumatism. To these first symptoms, which are common both to cases of foreign bodies in the joints, and other diseases of these parts, are soon added other particular signs, by which the nature of the case is evinced.

As the extraneous bodies are in general free and moveable in the joint, they can easily be made to slip about from one part of the articulation to another: a circumstance, which is facilitated by the smoothness of their surface, as well as by the synovia, which is mostly in larger quantity than natural. According to the situation, which they happen to occupy, sometimes they produce acute pain; sometimes no pain whatever. When they lodge in a depression, where they are not compressed, they cause no pain; and if they could be always kept in this position, their presence would not be likely to excite any inconveniences. But, when they get between the articular surfaces, which in certain postures of the limb come into contact with each other, the following are the effects of the compression. Sometimes, the extraneous substance suddenly glides between the condyles of the thigh bone and head of the tibia, and while it lodges there, excites acute pain in certain directions of the limb, and instantaneous loss of the power of moving the knee. But, when it shifts its place again, either naturally, or accidentally, during an examination of the affected part, the compression is removed, the pain all at once ceases, and the functions of the joint are as suddenly restored. Most frequently, when the extraneous body gets behind the patella, or the ligament of the patella, as the patient is walking, he is compelled to make a sudden stop, and would fall down from the acuteness of the pain, if nothing were at hand to save him. Some patients have been observed, however, who experienced no pain in these circumstances. Reimarus mentions a man, who suffered great pain, and could not move his leg, when the extraneous body was at the side of the joint; but was immediately relieved by pushing it under the patella. B. Bell met with cases, in which the pain was so violent at the instant when the patients put their legs in certain postures, that fainting was brought on, and they were so afraid of a return of the suffering, that they preferred remaining perfectly quiet to running any risk of causing the pain again. He even asserts, that he had known some persons, in whom the least motion of the limb would cause such pain as awoke them out of the deepest sleep. The pain, excited by the situation of the extraneous body betwixt the articular surfaces, recurs at intervals more or less long, and always in consequence of some motion, or exertion. Sometimes it ceases directly by the effect of a movement, contrary to that which produced it; but most frequently it continues, and then the surrounding soft parts are affected with swelling, which obliges the patient to keep his bed, and have recourse to emollient anodyne applications. Sometimes, as I have already noticed, the foreign body lies at a part of the joint, where it causes no inconvenience, and makes no pressure on the articular surfaces. In this case, all the symptoms have been known to cease for several months, so that the patient imagined himself cured, when suddenly, the foreign body was urged by some effort into another situation, where it occasioned a renewal of all the former pain.

The foregoing circumstances afford strong presumptive evidence of the presence of extraneous cartilaginous substances in the joint; but, they do not amount to certainty: this can only be acquired by the touch. In handling the knee of the patient, the surgeon feels a hard, prominent substance, which slips about under his fingers, and glides under the patella, or the ligament of this bone, and sometimes under the tendon of the extensor muscles of the leg, from one side of the joint to the other. The extraneous body may make its appearance either at the inside or the outside of the articulation; but, it most frequently presents itself at the former part, which is the broadest and most sloping, while the capsular ligament there is loosest. Desault met with one instance, in which the capsular ligament and soft parts were so loose, that the patient could turn the extraneous substance round and round.

In general, the complaint is not dangerous; but, as it is painful, and obstructs, or often prevents walking; and usually can be cured only by an operation, which has sometimes had fatal consequences; we cannot be too much upon our guard in delivering a prognosis.

It is only in the knee, that the disease ever becomes so troublesome as to require an operation, or, indeed, any surgical treatment.

If we except making an incision into the joint, for the purpose of extracting the cartilaginous tumours, we are not acquainted with any certain means of freeing a patient from the inconvenience of the complaint. To this plan, the danger attendant on all wounds of so large an articulation as the knee, is a very serious objection. Middleton and Gooch endeavoured to conduct the extraneous body into a situation, where it produced no pain, and to retain it in that position a long time by bandages, under the idea, that the cartilaginous substance would adhere to the contiguous parts, and occasion no future trouble. Some will be inclined to think, that no positive conclusion ought to be drawn from the cases brought forward by these gentlemen, because they had no opportunity of seeing their patients again at the end of a reasonable length of time, and we know, that loose cartilages in the joints sometimes disappear for half a year, and then make their appearance again. Yet, perhaps, the very circumstance of the patients not applying again, may justify the inference, that sufficient relief had been obtained.

However, it should not be concealed, that this method was also tried in St. George's Hospital without benefit, and that in one case, the pain was increased by it. (See *Reimarus de Fungo Articulorum,* § 27, 54, *&c.*)

Mr. Hey, aware of the dangerous symptoms, which have occasionally resulted from the most simple wounds penetrating the knee-joint, was induced to try the efficacy of a laced knee-cap, and the cases, which he has adduced, clearly demonstrate, that the benefit thus obtained, is not temporary, at least, as long as the patient continues to wear the bandage. In one case, the method had been tried for ten years, with all the success which the patient could desire. Boyer also made one patient use a knee-cap for a year; after which it was left off, the patient appearing cured. And, in a second instance, the same practitioner tried the plan, which put a stop to the pain, and enabled the patient to walk with ease; but it was not known whether the method was properly continued, as the patient had not latterly been seen. (*Boyer, Traité des Mal. Chir. T.* 4, *p.* 444.)

Contemplating the evidence upon this point, and the perilous symptoms, sometimes following wounds of the knee-joint, I am decidedly of opinion, that the effect of a knee-cap, or of a roller and compress, applied over the loose cartilage, ought generally to be tried, before having recourse to excision. I say generally, because the conduct of the surgeon ought, in such cases, to be adapted to the condition and inclination of the patient. If a man be deprived of his livelihood, by not being able to use his knee; if he cannot, or will not take the trouble of wearing a bandage; if he be urgently desirous of running the risk of the operation after things have been impartially explained to him; if a bandage should not be productive of sufficient relief; and lastly, if excessive pain, severe inflammation of the joint, a great deal of symptomatic fever, and lameness, should frequently be produced by the complaint, (See *Brodie's Pathological and Surg. Obs. p.* 299,) I think it is the duty of a surgeon to operate. It is very certain, that success has generally attended the operation; but, small as the chance is of losing the limb, and even life, in the attempt to get rid of the disease, since the inconveniences of the complaint are, in most cases, very bearable, and are even capable of palliation by means of a bandage, endangering the limb and life in any degree, must seem to many persons contrary to the dictates of prudence. At all events, we must agree with Boyer, that, as a laced knee-cap can do no harm, we ought always to make trial of it, and never perform the operation, except when pressure does not answer, and the return of frequent and violent pain makes the employment of the knife necessary. (See *Traité des Mal. Chir. T.* 4, *p.* 445.)

I am ready to allow, with M. Brochier, that the danger attendant on wounds of the large joints, has always been exaggerated in consequence of ancient prejudices. (*Desault's Journ. Vol.* 2.) But, making every allowance for the influence of prejudice, a man must be very sceptical indeed, who does not consider the wound of so large a joint as the knee, attended with real cause for the apprehension of danger. See Case 2, in my *Treatise on the Diseases of the Joints.* At the end of Mr. Ford's case, (*Med. Obs. and Inquiries, Vol.* 5.) we read on the subject of cutting loose cartilages out of the knee:

"The society have been informed of several cases, in which the operation has been performed; some, like this, have healed up without any trouble; others have been followed by violent inflammation, fever, and death itself." The history of a case has lately been published, in which the patient very nearly lost his life from suppuration in the knee-joint after this operation. (See *Kirby's Cases, p.* 75.) In the same work, reference is also made to two other cases, which actually had a fatal termination; (*p.* 82:) and even in Mr. Kirby's own instance, the recovery was not effected, without the entire loss of the motions of the knee.

As the disorder is often attended with a degree of heat and tenderness in the articulation; as the danger of the operation is, in a great measure, proportioned to the subsequent inflammation; and, as much of the danger is at once removed, if the wound unite by the first intention; the advice to keep the patient in bed a few days before operating, to apply leeches and cold saturnine lotions to the knee during the same time, and to exhibit beforehand a saline purgative, is highly prudent.

I shall next introduce an account of the plan of operating, as described by several of the best modern surgeons.

"As these loose bodies cannot always be found, no time can be fixed for the operation; but the patient, who will soon become familiar with his own complaint, must arrest them when in a favourable situation, and retain them there till the surgeon can be sent for.

"Before the operation, the limb should be extended upon a table in an horizontal position, and secured by means of assistants; the loose cartilages are to be pushed into the upper part of the joint above the patella, and then to one side; the inner side is to be preferred, as in that situation only the vastus internus muscle will be divided in the operation. Should there be several of these bodies, they must be all secured, or the operation should be postponed till some more favourable opportunity, since the leaving of one will subject the patient to the repetition of an operation, not only painful, but attended with some degree of danger.

"The loose bodies are to be secured in the situation above-mentioned by an assistant, a task not easily performed while they are cut upon, from their being lubricated by the synovia; and if allowed to escape into the general cavity, they may not readily, if at all, be brought back into the same situation.

"The operation consists in making an incision upon the loose cartilage, which it will be best to do in the direction of the thigh, as the wound will more readily be healed by the first intention. If the skin is drawn to one side, previously to making the incision, the wound through the parts underneath will not correspond with that made in the skin, which circumstance will favour their union. The incision upon the cartilage must be made with caution, as it will with difficulty be retained in its situation if much force is applied. The assistant is to endeavour to push the loose body through the opening, which must be made sufficiently large for that purpose; but as this cannot always be done, the broad end of an eyed probe may be passed under it, so as to lift it out, or a sharp-pointed instrument may be stuck into it, which will fix it to its situation, and bring it more within the management of the surgeon.

"The cartilages being all extracted, the cut edges of the wound are to be brought together, and, by means of a compress of lint, not only pressed close to one another, but also to the parts underneath, in which situation they are to be retained by sticking plaster, and the uniting bandage.

"As union by the first intention is of the utmost consequence after this operation, to prevent an inflammation of the joint, the patient should remain in bed with the leg extended, till the wound is perfectly united, or at least all chance of inflammation at an end." (*Home, in Trans. for the Improvement of Med. and Chir. Knowledge, Vol.* 1, *p.* 239, *&c.*)

In one instance, Desault proceeded in the following manner: the surgeon, after relaxing the capsular ligament by extending the leg, brought the extraneous body on the inside of the articulation against the attachment of the capsular ligament, and secured it in this situation, between the index finger and thumb of the left hand, whilst an assistant drew the integuments forwards towards the patella. The parts, covering this extraneous body, were now divided by an incision one inch in length, and its extraction accomplished by pushing it from above downwards, and raising it inferiorly with the end of the knife. This substance, on examination, was found similar in colour to the cartilages that cover the articular surfaces: it was three-quarters of an inch in length, six lines and a half in width, and three lines in thickness; its surfaces were smooth, one concave and the other convex: its circumference irregular, disseminated with red points, forming small depressions; the inside was ossified, the outside of a cartilaginous texture. As soon as the substance was extracted, the assistant let go the integuments which he had drawn forwards; they consequently returned to their natural situation, on the inner side of the knee-joint, in such a manner, that the external wound in the integuments was situated more inward, than the one in the capsular ligament. Two advantages were procured by this means: on the one hand, air was prevented from penetrating into the articulation; and on the other, the floating portion of capsular ligament, retained inwards by the skin, was more likely to attach itself to the condyle, in case it did not unite to the other portion of the capsule divided near its attachment. The edges of the wound were brought into contact by means of a uniting bandage; dry lint and compresses were applied, and retained on the part by a slight bandage; and the limb was kept in a state of extension. (*Desault's Journal, T.* 2.) According to Mr. Abernethy, the inner surface of the internal condyle of the os femoris presents an extensive and nearly a plain surface, which terminates in front and at its upper part by an edge which forms a portion of a circle. If the points of the finger be firmly pressed upon this edge so as to form a kind of line of circumvallation round these (cartilaginous) bodies, they cannot pass into the joint in this direction, nor can they recede in any other, on account of the tense state of the internal lateral ligament. Here these substances are near the surface, and may be distinctly felt: and they may be exposed by simply dividing the integuments, fascia, and the capsule of the joint.

In an interesting case, which Mr. Abernethy relates, the integuments of the knee were gently pressed towards the internal condyle, and the fingers of an assistant applied round the circular edge of the bone. The integuments were gently drawn towards the inner ham string, and longitudinally divided, immediately over the loose substance, to the extent of an inch and an half. This withdrawing of the integuments from their natural situation was designed to prevent a direct correspondence of the external wound to that in the capsule of the joint: for, when the integuments were suffered to regain their natural position, the wound in them was nearer to the patella, than the wound in the capsule. The fascia, which covers the joint, having been exposed by the division of the integuments, it was divided in a similar direction, and nearly to the same extent. The capsule was now laid bare, and gently divided to the extent of half an inch, where it covered one of the hard substances, which suddenly slipped through the opening, and by pressing gently upon the other, it was also discharged. The bodies, thus removed, were about three-quarters of an inch in length, and half an inch in breadth. They had a highly polished surface, and were hard like cartilage. The fluid contained in the joint was pressed toward the wound, and about two ounces of synovia were discharged. The wound of the integuments was then gently drawn towards the patella, and accurately closed with sticking plaster. (*Surgical Observations.* 1804.)

When there are several extraneous cartilaginous bodies in the joint operated upon, the surgeon ought to extract them all through the same wound, if it can be done without producing too much irritation of the capsular ligament, and they will admit of it. But, frequently, only one can be made to present itself at a time, or can be easily extracted. Each little tumour will then require a separate operation, which is a far safer plan, than disturbing the part by long and repeated attempts to extract them all at once. (*Boyer, Traité des Mal. Chir. T.* 4, *p.* 448.) The surgeon is also often obliged to make his incision at a particular point, because at no other can the extraneous substance be fixed. A case confirming all these latter observations was lately published by Dr. Clarke. (See *Med. Chir. Trans. Vol.* 5, *p.* 67.) In this instance, the operation was thrice performed upon the same knee-joint, with perfect success. Mr. Brodie also extracted five loose cartilages, by three different operations, without any subsequent unpleasant symptoms, although the patient appears to have been previously subject to repeated attacks of severe inflammation of the joint. (*Pathological and Surg. Obs. p.* 299.)

On the preceding subject some observations and two successful operations have been lately published by Baron Larrey. (See *Mémoires de Chir. Militaire, T.* 2, *p.* 421, *&c.*) With the exception of a few wrong theories, he appears to have given a fair account of the disease.

Hydrops Articuli signifies a collection of serous fluid in the capsular ligament of a joint. The knee is more subject, than other joints, to dropsical disease, which has been known, however, to affect the wrist, ankle, and shoulder joints. *Boyer, Traité des Mal. Chir. T.* 4, *p.* 456.)

Mr. Russel adopted the opinion, that some cases of this kind are venereal, and others scrofulous; but, he has not supported the doctrine on any solid foundation. Hydrops articuli generally arises from contusions, rheumatism, sprains, exposure to severe cold, the presence of extraneous cartilaginous bodies in the joint, and in general from any thing, which irritates the capsular ligament; and, as already explained, it is a common attendant on inflammation of the synovial membrane; the complaint also sometimes follows fevers; but, in most instances, it is purely a local affection, quite independent of general debility. (*Boyer, T.* 4, *p.* 467.)

Hydrops articuli presents itself in the form of a soft tumour; circumscribed by the attachments of the capsular ligament; without change of colour in the skin; accompanied with a fluctuation; it is indolent, and very little painful; causing hardly any impediment to the motion of the joint; yielding to the pressure of the finger, but not retaining any impression, as in œdema. The swelling does not occupy equally every side of the joint, being most conspicuous where the capsular ligament is loose and superficial. In the wrist it occurs at the anterior and posterior parts of the joint, but, especially, in the former situation, while it is scarcely perceptible at the sides. In the ankle, it is more apparent in front of the malleoli, than any where else; and, in the shoulder, it does not surround the joint, but is almost always confined to the forepart of it, and can only be seen in the interspace between the deltoid and great pectoral muscles.

In the knee joint, which is the common situation of hydrops articuli, the tumour does not occur behind the articulation; but at the front and sides. Behind, the capsular ligament is too narrow to admit of being much distended with the synovia; while, in front, and laterally, it is broad, so that it can there yield considerably in proportion as the quantity of fluid increases. The swelling is at first circumscribed by the attachments of the capsular ligament; but, in consequence of the accumulation of fluid, it afterward exceeds these limits above, and spreads more or less upward between the thigh bone and the extensor muscles of the leg, which are lifted up by it. Boyer has seen it reach to the upper third of the thigh. The swelling is irregular in shape: it is most prominent where the capsular ligament is wide and loose, and it is in some measure divided longitudinally into two lateral portions, by the patella, the ligament of the patella, and the tendon of the extensor muscles of the leg, all which parts the synovia raises, and pushes forward, though in a much less degree than the capsular ligament. Of these lateral portions, the internal is broadest and most prominent, because the part of the capsule between the patella and edge of the internal condyle being larger than that situated between the patella and edge of the external condyle, yields in a greater degree to the distending fluid. The motions of the leg, which are generally little interrupted by this disease, make a difference in the shape and consistence of the swelling. In flexion, the tumour becomes harder, tenser, and broader and more prominent at the sides of the knee-pan, which is somewhat depressed by its ligament. In extension, the tumour is softer, and the fluctuation plainer.

In order to feel distinctly the fluctuation, which is one of the best symptoms of the disease, the ends of two or three fingers should be placed on one side of the swelling, while the opposite side is to be struck with the end of the middle finger of the other hand.

The patella, being pushed forward, away from the articular pulley, is very moveable, and, as it were, floating. When it is pressed backward, while the leg is extended, it can be felt to move a certain way before it meets with the resistance of the articular pulley. And on the pressure being discontinued, it immediately separates from this part again.

By such symptoms, hydrops articuli may easily be distinguished from other diseases of the joints, from tumours of the bursa mucosa under the extensor tendons of the leg; from ganglions in front of the knee-pan; from rheumatism; œdema, &c.

The prognosis is most favourable, when the swelling is recent and small, and has been quick in its progress. On the contrary, when the tumour is of long standing and large; the effused fluid thick and viscid; and the synovial membrane thickened; the removal of the fluid by absorption, and the restoration of the parts to their natural state, will be more slow and difficult. The worst case is that which is complicated with disease of the capsular ligament, cartilages, and bones.

The cure of the above-described dropsical affection of the joints, depends upon the absorption of the effused fluid. And, when the case is combined with acute or chronic inflammation of the synovial membrane, the treatment is the same as that already recommended for those particular forms of disease. When inflammation subsides, the absorption of the fluid is sometimes altogether spontaneous, and it may always be promoted, by mere friction, by rubbing the joint with camphorated mercurial ointment, and particularly, by the employment of blisters.

The operation of a blister may be very materially assisted with a moderately tight bandage. Among other effectual means of cure, we may enumerate frictions with flannel impregnated with the fumes of vinegar; electricity; and the exhibition of mercurial purgatives. When hydrops articuli occurs during the debility, consequent to typhoid, and other fevers, the complaint can hardly be expected to get well, before the patient has regained some degree of strength.

As, however, hydrops articuli is generally quite a local disease, Boyer contends, that it should be chiefly treated with topical remedies; and he sets down diuretics, sudorifics, hydragogues, &c. as improper or inefficient. (*Op. cit. p.* 467.) He is strongly in favour of repeated blisters, both for the prevention and cure of the disease.

Circumstances do not often justify making an opening into the joint: but, excessive distention, in some neglected cases, might certainly be an urgent reason for performing such an operation. Also, if the complaint should resist all other plans of treatment, and the irritation of the tumour greatly impair a week constitution, the practice would be justifiable. An interesting example of this kind is related by Mr. Latta. (*System of Surgery, Vol.* 2, *p.* 490.)

It is best to make the opening in such a way, that the wound in the capsular ligament after the operation, will not remain directly opposite the wound in the skin. For this purpose, the integuments are to be pushed to one side, before the surgeon divides them. (*Encyclopédie Méthod. Part. Chir. Art. Hydropsie des Jointures.*)

The operation is not always successful, being sometimes followed by alarming symptoms, which either end fatally, or occasion a necessity for amputation. The fluid also generally collects again, and as the synovial membrane is mostly thickened, it often inflames, and suppuration in the joint ensues. Hence, when hydrops articuli originates from rheumatism; when it is recent, indolent, and not large; and when it does not seriously impair the functions of the joint; Boyer recommends the operation not to be done. But, he sanctions its performance, when the disease is combined with extraneous cartilaginous bodies in the joint: or when it is very considerable, attended with severe pain, and impairment of the functions of the joint. (*Op. cit. T.* 4, *p.* 473.)

Collections of Blood in Joints.—Most systematic writers speak of this kind of case, though it must be uncommon. Tumours about the joints, composed of blood, and set down in numerous surgical works, as extravasations within the capsular ligaments are generally on the outside of them.

Certainly, if a collection of fluid were to take place in a joint immediately after a sprain, or contusion, and to continue to increase gradually for some time afterward, there would be reason to believe most of the contents of the tumour to be blood. The production of an abscess, and the secretion of any fluid, would have required a longer time.

Were blood known to be undoubtedly effused in a large articulation, however, no man would be justified in making an opening for its discharge. No bad symptoms are likely to result from its mere presence, and the absorbents will, in the end, take it away. If an incision were made into the joint, the coagulated state of the extravasated blood would not allow such blood to be easily discharged.

The best plan is to apply discutient remedies; a lotion of vinegar, spirits of wine, and muriate of ammonia for the first three or four days; and afterward, friction with camphorated liniments may be safely adopted.

Mr. Hey relates a case, in which the knee-joint was wounded, and blood insinuated itself into the capsular ligament; yet though the occurrence could not be hindered, no harm resulted from the extravasation, which was absorbed, without having created the smallest inconvenience. (*Practical Obs. in Surgery, p.* 354.)

White Swelling.—The white swelling, or spina ventosa, as it was at one time not unfrequently called, in imitation of the Arabian writers, Rhazes and Avicenna, has been a name indiscriminately applied to many diseases, which differ widely in their nature, curability, and treatment. Wiseman was the first who used the term White-Swelling; and if the expression did not confuse together complaints of very different kinds, not much fault could be found with it, because it unquestionably conveys an idea of one mark of some of these distempers, which is, that notwithstanding the increase of size in the joint, the skin is generally not inflamed, but retains its natural colour. (*Pott.*)

The name, therefore, appears objectionable, only inasmuch, as it has tended to prevent the introduction of a sufficient number of well-founded and necessary distinctions. Systematic writers have generally been content with a distinction into two kinds, viz. *rheumatic*, and *scrofulous*.

The last species of the disease they also distinguish into such tumours, as primarily affect the bones, and then the ligaments and soft parts; and into other cases, in which the cartilages, ligaments, and soft parts become diseased before there is any morbid affection of the bones.

Mr. Brodie has endeavoured to form a more correct classification of the different complaints, to which the term white-swelling is applied; and his descriptions are valuable, because confirmed by extensive observation, and numerous dissections. With respect to the disease beginning in the ligaments, if the capsular ligaments be put out of consideration, it is, as this gentleman observes, a rare occurrence, and he has never met with a case, in which the fact was proved by dissection. (*Pathol. and Surgical Obs. p.* 7.)

1. The first case is inflammation of the synovial membrane, as described in the foregoing pages, especially that form of the disease which often arises from cold, and constitutes the disease formerly often termed a rheumatic white swelling.

2. Another form of disease, ordinarily comprised under the general name of white-swelling, has been particularly described by Mr. Brodie: the disease originates in the synovial membrane, which loses its natural organization, and becomes converted into a thick, pulpy substance, of a light brown, and sometimes of a reddish brown colour, intersected by white membranous lines, and from 1-4 to 1-2 of an inch, or even more than an inch in thickness. As this disease advances, it involves all the parts of which the joint is composed, producing ulceration of the cartilages, caries of the bones, wasting of the ligaments, and abscesses in different places. The complaint has invariably proved slow in its progress, and sometimes has remained nearly in an indolent state for many months, or even for one or two years; but (says Mr. Brodie) "I have never met with an instance, in which a real amendment was produced; much less have I known any in which a cure was effected." (See *Medico-Chir. Trans. Vol.* 4, *p.* 220, *&c.*) The whole, or nearly the whole of the synovial membrane has always been found affected; though if a very early examination were made, Mr. Brodie conceives that this might not be the case, and in one example, he found only a half of the membrane thus altered, while the rest was of its natural structure. (*Pathol. and Surg. Obs. p.* 94.) This gentleman further acquaints us, that the preceding affection of the synovial membrane is rarely met with, except in the knee, that he has never known an instance of it in the hip or shoulder; that it is peculiar to the synovial membrane of the joints; that he has never known an instance of it in other serous membranes, nor even in the synovial membranes, which constitute the bursæ mucosæ and sheaths of tendons; and that it generally takes place in young persons, under, or not much above the age of puberty. In fact, Mr. Brodie has not met with more than one instance, in which it occurred after the middle period of life. "In the origin of this disease, there is a slight degree of stiffness and tumefaction, without pain, and producing only the most trifling inconvenience. These symptoms gradually increase: at last, the joint scarcely admits of the smallest motion, the stiffness being greater than where it is the consequence of simple inflammation. The form of the swelling bears some resemblance to that in cases of inflammation of the synovial

membrane, but it is less regular. The swelling is soft and elastic, and gives to the hand a sensation as if it contained fluid. If only one hand be employed in making the examination, the deception may be complete, and the most experienced surgeon may be led to suppose, there is a fluid in the joint when there is none; but if both hands be employed, one on each side, the absence of fluid is distinguished by the want of fluctuation

"The patient experiences little or no pain, until abscesses begin to form, and the cartilages ulcerate; and even then the pain is not so severe, as where the ulceration of the cartilages occurs as a primary disease, and the abscesses heal more readily, and discharge a smaller quantity of pus, than in cases of this last description. At this period, the patient becomes affected with hectic fever, loses his flesh, and gradually sinks, unless the limb be removed by an operation." (*Brodie, in Med. Chir. Trans. Vol.* 5, *p.* 251, 252.) In the majority of cases, this gentleman believes that *the gradual progress of the enlargement, the stiffness of the joint without pain, and the soft elastic swelling without fluctuation,* will enable the practitioner readily to distinguish this from all other diseases of the joints. However, when the diseased synovial membrane happens to be distended with a quantity of turbid serum and flakes of coagulable lymph, the complaint somewhat resembles in its feel and appearance that stage of common inflammation of the synovial membrane, where this part is left thickened, and more or less distended with coagulable lymph, but the impossibility of relieving the former case by the same means which cure the latter, and due attention to the history of the disease, will prove the difference between them. (*Brodie, Pathol. and Surg. Obs. p.* 96.)

3. Ulceration of the articular cartilages takes place in the advanced stage of several diseases of the joints, and it also exists in many instances as a primary affection, in the early stage of which, the bones, synovial membrane, and ligaments, are in a natural state. If neglected, it ultimately occasions the entire destruction of the articulation. It may be the consequence of inflammation of the cartilage itself, or of the bony surface, with which it is connected; but as Mr. Brodie further observes, in many instances, there are no evident marks of the disorder being preceded by any inflammatory action in one part or the other, and the inflammation, which afterward takes place, appears rather to be the attendant upon, than the cause of the ulcerative process. One striking peculiarity of ulceration of the articular cartilages is, that the process may take place without the formation of pus; for the disease often proceeds so far as to cause caries of the bones, and yet no purulent matter is found within the joint. (See *Brodie's Pathol. and Surgical Obs. &c. p.* 102.) The investigations of the same author dispose him to believe, that a conversion of these cartilages into a soft fibrous structure, is a frequent though not constant forerunner of ulceration. (*P.* 105.) When the ulceration of the cartilage occurs in the superficial joints, it constitutes one of the diseases which have been known by the name of white-swelling. From cases which Mr. Brodie has met with, he is led to conclude, that when it takes place in the hip, it is this disease, which has been variously designated by writers, the "*morbus coxarius,*" the "Disease of the Hip," the "Scrofulous Hip," the Scrofulous Caries of the Hip Joint." At least, says Mr. Brodie, it is to this disease, that these names have been principally applied, though probably other morbid affections have been occasionally confounded with it. (*Med. Chir. Trans. Vol.* 4, *p.* 236.) The ulceration of the articular cartilages takes place as a primary disease, chiefly in children, or adults under the middle age. "Of sixty-eight persons affected with this disease, fifty-six (according to Mr. Brodie) were under thirty years of age: the youngest was an infant of about twelve months; the oldest was a woman of sixty. As the knee is more frequently affected by inflammation of the synovial membrane, so is the hip more liable, than other joints, to the ulceration of the cartilaginous surfaces. In general the disease is confined to a single joint; but it is not very unusual to find two or three joints affected in the same individual, either at the same time, or in succession. Sometimes the patient traces the beginning of his symptoms to a local injury, or to his having been exposed to cold; but for the most part, no cause can be assigned for the complaint." (See *Med. Chir. Trans. Vol.* 6, *p.* 319.)

The symptoms of the disease of the hip joint will be described in the ensuing section, and we shall here confine our remarks to the symptoms characterizing ulceration of the cartilages of the knee, as pointed out by Mr. Brodie. They differ from those of inflammation of the synovial membrane, by the pain being slight in the beginning, and gradually becoming very intense, which is the reverse of what happens in the latter affection. The pain in the commencement is also unattended with any evident swelling, which never comes on in less than four or five weeks, and often not till after several months. It is not to be inferred, however, that every slight pain of the joint, unaccompanied with swelling, must of course arise from ulceration of the cartilages. But, says Mr. Brodie, when the pain continues to increase, and at last is very severe; when it is aggravated by the motion of the bones on each other, and when, after a time, a slight tumefaction of the joint takes place, we may conclude that the disease consists in such ulceration. The swelling arises from a slight inflammation of the cellular membrane on the outside of the joint: it has the form of the articulating ends of the bones; and for the most part it appears greater than it really is, in consequence of the muscles being wasted. No fluctuation is perceptible, as where the synovial membrane is inflamed; nor is there the peculiar elasticity, which exists where the synovial membrane has undergone a morbid alteration of its structure.

Mr. Brodie has explained, however, that

In some cases, the swelling has a different shape, and communicates the feel of a fluctuation. This happens when inflammation of the synovial membrane, attended with a collection of the synovia of the joint, or abscesses in the surrounding soft parts, or in the articulation itself, occur as secondary diseases. When there has been considerable destruction of the soft parts from abscesses and ulceration, the head of the tibia may become dislocated and drawn towards the ham. (See *Med. Chir. Trans. Vol.* 6, *p.* 326, *&c.*)

4. I shall pass over ulceration of the synovial membrane, which Mr. Brodie considers in a separate section, and now proceed to scrofulous white-swelling. In the scrofulous disease of the joints, the bones are primarily affected, in consequence of which, ulceration takes place in the cartilages covering their articular extremities. The cartilages being ulcerated, the subsequent progress of the disease (says Mr. Brodie) is the same as where this ulceration takes place in the first instance. (*Medico-Chir. Trans. Vol.* 4, *p.* 266.)

By Mr. Lloyd, scrofulous white swellings are divided into three stages; the first being that in which the affection is confined to the bone; the second, that in which the external parts become thickened and swelled; and the third being what he names the suppurative stage, attended with ulceration of the cartilages, inflammation of the synovial membrane, and abscesses. (*On Scrofula, p.* 121.) It was formerly a common notion, that in white-swellings, the heads of the bones were always enlarged. Mr. Russel, I believe, is the first writer who expressed an opposite sentiment, and he distinctly declares, *that he had never heard, nor known of an instance in which the tibia was enlarged from an attack of white-swelling.* (*P.* 37.) The inaccuracy of the opinion was afterward pointed out by Mr. Lawrence, to the late Mr. Crowther, and the subject was mentioned in the earliest edition of the "First Lines of the Practice of Surgery."

Deceived by the feel of many diseased joints, and influenced by general opinion, I once supposed, that there was generally a regular expansion of the heads of scrofulous bones. But excepting an occasional enlargement, which arises from spiculæ of bony matter, deposited on the outside of the tibia, ulna, &c. and which alteration cannot be called an expansion of those bones, I never until lately saw the head of a bone enlarged, in consequence of the disease known by the name of white-swelling. I was formerly much in the habit of inspecting the state of the numerous diseased joints, which were every year amputated at St. Bartholomew's Hospital, and though I was long attentive to this point, my searches after a really enlarged scrofulous bone always proved in vain. Nor was there at that period any specimen of an expanded head of a scrofulous bone in Mr. Abernethy's museum. Within the last few years, however, a specimen of an enlargement of the upper head of the ulna has been found, and it was some time ago shown to me by Mr. Stanley. My friend, Mr. Langstaff, is said to have in his possession a knee-joint, in which the femur and tibia are much expanded, "the external laminæ of the bones not being thicker than when the bones are of their natural size, and the *cancelli healthy, though of rather greater solidity than natural.* (*Lloyd on Scrofula, p.* 148.) However, this last form of disease evidently does not resemble the common scrofulous affection of the heads of the bones. I may add, that Mr. Wilson, whose dissections have been very numerous, concurs with the best modern writers, concerning the rarity of an actual expansion of the substance of the heads of the bones. (*On the Skeleton, &c. p.* 336.) I have also heard of a few other instances in which the heads of the bones were actually enlarged in cases of white-swelling. However, I believe the occurrence is far from being usual, and doubts may yet be entertained, whether such enlargement is combined with the following alteration of structure. The change which the head of the tibia undergoes in many cases, is first a partial absorption of the phosphate of lime throughout its texture, while at first a transparent fluid, and afterward a yellow cheesy substance are deposited in the cancelli. In a more advanced stage, and indeed, in that stage, which most frequently takes place before a joint is amputated, the head of the bone has deep excavations in consequence of caries, and its structure is now so softened, that when an instrument is pushed against the carious part, it easily penetrates deeply into the bone. Occasionally, as my friend Mr. Lloyd has observed, all the bones of a joint are affected in this way; but frequently only one of them. (*On Scrofula, p.* 120.)

According to a modern writer, "The morbid affection appears to have its origin in the bones, which become preternaturally vascular, and contain a less than usual quantity of earthy matter, while, at first, a transparent fluid, and afterward a yellow cheesy substance, is deposited in their cancelli. From the diseased bone, vessels, carrying red blood, shoot into the cartilage, which afterward ulcerates in spots, the ulceration beginning on that surface, which is connected to the bone. As the caries of the bones advances, pus is collected in the joint. At last, the abscess bursts externally, having formed numerous and circuitous sinuses." (*Brodie, in Med. Chir. Trans. Vol.* 4, *p.* 272, *and Pathol. Obs. p.* 227.) The above-described alteration of the structure of the bones, this author has never seen in the cranium, nor in the middle of the cylindrical bones; but, it is asserted by another late writer, that the cheesy matter sometimes pervades the canceli of the whole bone, and is deposited in innumerable portions of the most minute size. (*E. A. Lloyd on Scrofula, p.* 120.) Also, with respect to the increased vascularity of the diseased part of the bone, although Mr. Lloyd assents to the truth of this statement, as applied to the early stage of the disorder, he represents the vascularity as afterward being diminished, in proportion as the quantity of cheeselike deposit increases. (*Vol. cit. p.* 122, 123.)

A cursory examination of a diseased joint, even when it is cut open, will not suffice to show, that the heads of the bones have not acquired an increase of size. In making a dissection of this kind, in the presence of a medical friend, I found that, even after the joint had been opened, the swelling had every appearance of arising from an actual expansion of the bones. The gentleman with me felt the ends of the bones after the integuments had been removed, and he coincided with me, that the feel, which was even now communicated, seemed to be caused by a swelling of the bones themselves. But, on cleaning them the enlargement was demonstrated to arise entirely from a thickening of the soft parts. So unusual, indeed, is the expansion of the heads of the bones, that the late Mr. Crowther, who paid great attention to these cases, joined Mr. Russel in believing, that such a change never happened; a conclusion not entirely correct. (See *Practical Obs. on White-Swelling, &c. Edit.* 2, *p.* 14, 1808.)

Mr. Russel has particularly noticed how much the soft parts frequently contribute to the swelling. He describes the appearances on dissection thus: "The great mass of the swelling appears to arise from an affection of the parts, exterior to the cavity of the joint, and which, besides an enlargement in size, seem also to have undergone a material change in structure. There is a larger, than natural, proportion of a viscid fluid, intermixed with the cellular substance; and the cellular substance itself has become thicker, softer, and of a less firm consistence, than in a state of health." (*On the Morbid Affections of the Knee, p.* 30.) The manner, in which the soft parts are affected, is also described by Mr. Brodie: "Inflammation takes place of the cellular membrane, external to the joint. Serum, and afterward coagulable lymph, are effused, and hence arises a puffy elastic swelling in the early, and an œdematous swelling in the advanced stage of the disease.

"Scrofula attacks only those bones, or portions of bones, which have a spongy texture, as the extremities of the cylindrical bones, and the bones of the carpus and tarsus; and hence, the joints become affected from their contiguity to the parts, which are the original seat of the disease." (See *Medico-Chir. Trans. Vol.* 4, *p.* 273.)

In the cavity of the joint, we sometimes find a quantity of curdy matter, and the cartilages absorbed in various places, but more particularly round the edges of the articular surfaces.

As the name of the disease implies, the skin is not at all altered in colour. According to Mr. Lloyd, the first decided symptom of disease going on in the articulating extremity of a bone, is an occasional deep-seated, dull, heavy pain, unattended by swelling, and not increased by motion; and if it be the hip, knee, or ankle, which is affected, the patient keeps the knee rather bent, and never fully extends it in progression. (*On Scrofula, p.* 138.) In some instances, the swelling yields in a certain degree to pressure; but it never pits, and is almost always sufficiently firm to make an uninformed examiner believe, that the bones contribute to the tumour. It is remarked by Mr. Brodie, that while the disease is going on in the cancellous structure of the bones, before its effects have extended to the other textures, and while there is still no evident swelling, the patient experiences some degree of pain, which however, is never very severe, and often is so slight, that it is scarcely noticed. After a time, varying from a few weeks to several months, the external parts begin to swell, and serum and coagulable lymph to be effused in the cellular membrane so as to form a puffy, elastic swelling. (*Pathol. Obs. p.* 231.) In the majority of scrofulous white-swellings, let the pain be trivial, or more severe, it is particularly situated in one part of the joint: viz. either the centre of the articulation, or the head of the tibia. Sometimes, the pain continues without interruption; sometimes there are intermissions; and in other instances, the pain recurs at regular times, so as to have been called by some writers, periodical. Almost all authors describe the patient, as suffering more uneasiness in the diseased part, when he is warm, and particularly, when he is in this condition in bed.

In the early stage of the disease, the swelling is mostly very inconsiderable, or there is even no visible enlargement whatever, excepting perhaps after exercise. In the little depressions, naturally situated on each side of the patella, a fullness generally first shows itself, and gradually spreads all over the affected joint. According to Mr. Lloyd, however, when the soft parts on the outside of the knee-joint, permanently swell, the swelling often commences on each side, just behind the condyles, so that the joint appears wider, and he says, that he has often seen the enlargement commence by the swelling of a gland, immediately above the inner condyle. He observes, however, that there is no point of the joint, where the swelling may not begin. (*Op. cit. p.* 139.)

The patient, unable to bear the weight of his body on the disordered joint, in consequence of the great increase of pain thus created, gets into the habit of only touching the ground with his toes, and the knee being generally kept a little bent in this manner, soon loses the capacity of being completely extended again. When white-swellings have lasted a good while, the knee is almost always found in a permanent state of flexion. In scrofulous cases, the pain constantly precedes any appearance of swelling; but the interval between the two symptoms differs very much in different subjects.

The morbid joint, in the course of time, acquires a vast magnitude. Still the integuments retain their natural colour, and remain unaffected. The enlargement, however, always seems greater than it really is, in consequence of the emaciation of the limb both above and below the disease.

An appearance of blue distended veins, and a shining smoothness, are the only alterations to be noticed in the skin covering the enlarged joint. The shining smoothness seems attributable to the distention, which obliterates the natural furrows and wrinkles of the cutis. When the joint is thus swollen, the integuments cannot be pinched up into a fold, as they could in the state of health, and even in the beginning of the disease.

As the distemper of the articulation advances, the cartilages ulcerate, and collections of matter form around the part, and at length burst. Their progress, as Mr. Brodie has stated, is slow, and when they burst, or are opened, they discharge a thin pus, with portions of a curdy substance floating in it. The discharge afterward becomes less copious, and thicker. (*Pathol. Obs. p.* 234.) The ulcerated openings sometimes heal up; but, such abscesses are generally followed by other collections, which pursue the same course. In some cases, these abscesses form a few months after the first affection of the joint; on other occasions, several years elapse, and no suppuration of this kind makes its appearance. They sometimes communicate with the cavity of the diseased joint, or lead down to diseased bone, portions of which occassionally exfoliate. In the generality of cases, several abscesses take place in succession, some healing up, and others ending in sinuses.

As the cartilages continue to ulcerate, Mr. Brodie has observed, that the pain becomes aggravated, though not in a very great degree, and, he says, that it is not severe, until an abscess has formed, and the parts over it are distended and inflamed. (*Pathol. Obs. p.* 234.)

The local mischief must necessarily produce more or less constitutional disturbance. The patient's health becomes gradually impaired, he loses his appetite and natural rest and sleep; his pulse is small and frequent; and obstinate debilitating diarrhœa, and profuse nocturnal sweats ensue. These complaints are, sooner or later, followed by dissolution, unless the constitution be relieved in time, either by the amendment or removal of the diseased part. In different patients, however, the course of the disease, and its effects upon the system, vary considerably, in relation to the rapidity with which they occur.

Rheumatic white-swellings, or inflammations and thickenings of the synovial membrane from cold, or other causes, are very distinct diseases from the scrofulous distemper of the large joints. In the first, the pain is said never to occur without being attended with swelling. Scrofulous white-swellings, on the other hand, are always preceded by a pain, which is particularly confined to one point of the articulation. In rheumatic cases, the pain is more general, and diffused over the whole joint.

Mr. Lloyd thinks, that the scrofulous white-swelling may be distinguished from all other diseases of the joints, by its being attended with less pain, by the great degree of external swelling often existing for a long time before matter forms in the cavity of the articulation, and by the swelling being but little diminished by any discharge of matter, which may take place. In its first stage, before the interior of the joint is affected, it may be distinguished from primary ulceration of the cartilages, by the pain not being much increased by motion. The grating, produced by moving the joint, is also commonly less in this disease, than in ordinary ulceration of the cartilages. (*Lloyd on Scrofula, p.* 142.) And, according to Mr. Brodie, the principal criterion between scrofulous diseases of joints and the primary ulceration of cartilages, is the little degree of pain in the former cases, which is never much complained of before an abscess forms, not particularly severe, "except in a very few instances, and in the most advanced stage of the disease, when a portion of ulcerated bone has died, and having exfoliated, so as to lie loose in the cavity of the joint, irritates the parts, with which it is in contact, and thus becomes a source of constant torment." (*Brodie's Pathol. Obs. p.* 236.)

It seems probable, that cases, in which the cancellous structure of the bones is found quite undiseased, and in which the mass of disease is confined to the soft parts, are not scrofulous white-swellings. Few persons, who have attained the age of five and twenty, *without having had the least symptom of scrofula*, ever experience, after this period of life, a first attack of the white-swelling of the strumous kind. The general correctness of this observation, I believe, is universally admitted, and that there are but few exceptions to it is confirmed by the statements of Volpi, of Pavia. However, Mr. Lloyd attended a man, who, at the age of between forty and fifty, died of phthisis and had at the time a scrofulous ankle, besides several abscesses about his hip and groin. And the same gentleman met with another patient upwards of forty years old, with a similar disease. (*On Scrofula, p.* 137.) But, if these patients had had no marks of scrofula in their younger days, a circumstance not specified, they form deviations from what is usual, as indeed Mr. Lloyd seems to admit. My own observations lead me fully to concur with Mr. Brodie, that the scrofulous affections of the joints, so frequent in children, are rare after the age of thirty. (*Pathol. Obs. p.* 229.) All cases, in which the internal structure of the heads of the bones becomes softened, previously to the affection of the cartilages, and soft parts, are probably scrofulous.

Mr. Russel has noticed the frequent enlargement of the lymphatic glands in the groin, in consequence of the irritation of the disease in the knee; but he justly adds, that this secondary affection never proves long troublesome.

When the bones are diseased, the head of the tibia always suffers more than the condyles of the thigh bone. (*Russel.*) The articular surface of the femur sometimes has not a single rough or carious point, notwithstanding that of the tibia may have suffered a great deal. The cartilaginous coverings of the heads of the bones are generally eroded first at their edges; and, in the knee, the cartilage of the tibia is always more affected, than that covering the condyles of the thigh-bone. Indeed, when white-swellings have their origin in the bones, and the knee is the seat of the disorder, there is some ground for supposing, that it is in the tibia, that the morbid mischief usually first commences.

The ligaments of the knee are occasionally so weakened, or destroyed that the tibia and fibula become, more or less, dislocated backward, and drawn towards the tuberosity of the ischium, by the powerful action of the flexor muscles of the leg. It is observed by Mr. Brodie, that, just as ulceration of the cartilages is sometimes followed by dislocation of the hip, so we find, that dislocation of the knee occasionally takes place from the same cause. Where there has been considerable distention of the soft parts, in consequence of ulceration extending to them, the head of the tibia is gradually drawn backward by the action of the flexor muscles; and Mr. Brodie has even known this happen, previously to the formation of any abscesses. (*Pathol. Obs. p.* 159.)

I have seen a curious species of white-swelling, in which the leg could be bent to each side to a very considerable distance, both when the knee was extended and bent: a state implying a preternatural looseness, or perhaps a destruction, of the ligaments of the articulation.

Scrofulous white-swellings, no doubt, are under the influence of a particular kind of constitution, termed a *scrofulous* or *strumous habit*, in which every cause, capable of exciting inflammation, or any morbid and irritable state of a large joint, may bring on the present severe disease. On the other hand, in a man of a sound constitution, a similar irritation would only induce common healthy inflammation of the joint. In scrofulous habits, it also seems as if irritation of a joint is much more easily produced, than in other constitutions; and no one can doubt, that when once excited in the former class of subjects, it is much more dangerous, and difficult of removal, than in other patients.

The doctrine of particular white-swellings being scrofulous diseases, is supported by many weighty reasons, the opinions of the most accurate observers, and the evidence of daily experience. Wiseman (*Book* 4, *chap.* 4) calls the *spina ventosa* a species of scrofula, and tells us, that infants and children are generally the subjects of this disease. The disorder is said by Severinus to be exceedingly frequent in young subjects. Petrus de Marchettis has observed both male and female subjects affected with what are called strumous diseases of the joints, as late as the age of five and twenty; but not afterward, unless they had suffered from scrofula before that period of life, and had not been completely cured. R. Lowerus also maintains a similar opinion. Even though a few persons have scrofulous diseases of the joints, for the first time, after the age of twenty-five, this occurrence, like the first attack of scrofula after this period must be considered as extremely uncommon.

Another argument, in favour of the doctrine, which sets down particular kinds of white-swellings as scrofulous, is founded on the hereditary nature of such forms of disease.

Numerous continental surgeons, particularly Petit and Brambilla, have noticed how very subject the English are both to scrofula and white-swellings of the joints. We every day see, that young persons afflicted with the present disease, are generally manifestly scrofulous or have once been so. Frequently enlarged lymphatic glands in the neck denote this fatal peculiarity of constitution; and very often the patients are known to have descended from parents who had strumous disorders. (*Crowther.*) The disease is also frequently combined with swelled mesenteric glands, or tuberculated lungs. (*Brodie's Pathol. Obs. p.* 221.) As the same author remarks, since the disease depends upon a certain morbid condition of the general system, it is not surprising, that we should sometimes find it affecting several joints at the same time, or that it should show itself in different joints in succession; attacking a second joint after it has been cured in the first, or after the first has been removed by amputation. (*P.* 230.)

Besides the general emblems of a scrofulous constitution, which will be noticed in the article *Scrofula*, we may often observe a shining, coagulated, flaky substance, like white of egg, blended with the contents of such abscesses as occur in the progress of the disease. This kind of matter is almost peculiar to scrofulous abscesses, and forms another argument in support of the foregoing observations, relative to the share, which scrofula frequently has in the origin and course of many white-swellings.

Mr. Brodie's experience leads him to believe, that in scrofulous cases, the chance of ultimate recovery is much less, where the disease attacks the complicated joints of the foot and hand, than when it is situated in larger articulations of a more simple structure. (*Pathol. and Surg. Obs. p.* 235.)

Treatment of White-swellings.—In practice we meet with all these cases both scrofulous and rheumatic, in two very opposite states; sometimes the diseased joint is affected with a degree of acute inflammation; in other instances, the malady is entirely chronic.

The imprudence of patients in walking about, and disturbing the diseased part, is very often the occasion of a degree of acute inflammation, which is denoted by the tenderness of the joint when handled by the surgeon, and also by the integuments feeling hotter than those of the healthy knee. When such state exists, there can be no doubt, that topical bleeding, fomentations, emollient poultices, or cold saturnine lotions, are means which may be eminently serviceable. The antiphlogistic regimen is now strongly indicated. Cooling purges of the saline kind should also be exhibited. Blood may be taken from the arm, and also from the diseased part, either by means of leeches or cupping. Mr. Latta gives the preference to the latter method, whenever it can be employed; and he very properly remarks, that little advantage can be expected from topical bleeding of any kind, unless the quantity of blood taken away be considerable. Ten or twelve ounces by cupping should be taken away at a time, and the operation should be repeated at proper intervals, till the tenderness and heat of the skin have entirely subsided. When leeches are used, the number ought to be considerable, and Mr. Latta recommends the application of at least sixteen or twenty. (*System of Surgery, Vol.* 1, *Chap.* 6.)

Although antiphlogistic means are judicious when acute inflammation prevails; yet such practitioners as lose weeks and months in the adoption of this treatment, are highly censurable. While the skin is hot and tender, while the joint is affected with very acute and general pain, and while the patient is indisposed with the usual symptoms of inflammatory fever, great benefit may be rationally expected from the above plan. When, however, the disease is truly chronic, different plans are indicated. In ordinary cases of scrofulous disease of the joints, Mr. Brodie considers topical bleeding as usually unnecessary. (*Pathol. and Surgical Obs. p.* 240.)

It is quite unnecessary to expatiate on the mode of treating white-swellings, complicated with acute inflammation, particularly as the treatment of those cases, which consist of inflammation of the synovial membrane, has been already noticed, and may be said to be applicable to other forms of white-swelling, when they are attended with heat and inflammation of the soft parts. The most eligible plan of arresting the morbid process in the bones, cartilages, and soft parts surrounding the articulation, and the most successful method of lessening the chronic enlargement of the joint, are the subjects at present demanding our earnest investigation.

The works of Hippocrates, Celsus, Rhazes, Hieron, Fabricius, &c. compared with modern surgical books, will soon convince us, that the practice of the ancients, in the treatment of diseased joints, does not differ much from the plan now pursued by the best modern surgeons. Mr. Crowther remarks, that the ancients used local and general blood-letting, the actual and potential cautery, with vesicating and stimulating applications to the skin. They further maintained, that sores, produced by these means, should have their discharge promoted, and continued for a considerable length of time.

With regard to the cases which Mr. Brodie describes as depending upon a total loss of the natural structure of the synovial membrane, which is converted into a pulpy substance, one quarter or one half of an inch in thickness, though the progress of the disease may be somewhat checked by rest and cold lotions, it is, according to this gentleman, incurable, and at length it ends in ulceration of the cartilages, abscesses, &c. When there is considerable pain, in consequence of the cartilages beginning to ulcerate, partial relief may be derived from fomentations and poultices; but nothing will effect a cure. Hence, when the health begins to suffer, he considers amputation to be indicated. (*Med. Chir. Trans. p.* 254.)

When white-swellings are accompanied with ulceration of the cartilages, all motion of the joint is extremely hurtful. Indeed, as Mr. Brodie well observes, keeping the limb in a state of perfect quietude is a very important, if not the most important circumstance, to be attended to in the treatment. According to this gentleman, it is in these cases, in which ulceration of the cartilages occurs as a primary disease, that caustic issues are usually productive of singular benefit; but he deems them of little use in any other diseases of the joints. He thinks setons and blisters, kept open with savine cerate, may also be used with advantage. Bleeding is indicated only when, from improper exercise, the articular surfaces are inflamed, and there is pain and fever. Mr. Brodie asserts, that the warm bath relieves the symptoms in the early stage, if it does not stop the progress of the disease; but he condemns plasters of gum ammoniac, embrocations, liniments, and frictions, as either useless or hurtful. (See *Medico-Chir. Trans. Vol.* 6, *p.* 332—334.)

Topical applications, consisting of strong astringents of the mineral and vegetable kingdom, are of no service in examples of ulceration of the cartilages, or of the scrofulous form of the disease, though they often suffice for the cure of some mild descriptions of white-swelling, depending upon a thickening of the synovial membrane. A decoction of oak bark, containing alum, was recommended by Mr. Russel.

My own experience will not allow me to say any thing in favour of electricity, as an application for the relief of white-swellings; and it must be more likely to do harm than good, whenever the indication is to lessen irritation.

"If the tumour is quite indolent, (says Richerand) the application of galvanism may be proposed; it is not, however, exempt from danger; and, on one occasion, where I employed it, lancinating pains and swelling of the joint were brought on by it." (*Nosogr. Chir. T.* 3, p. 174, *Ed.* 2.)

Mr. John Hunter had confidence in cicuta and sea-bathing, as possessing power over many scrofulous diseases; and that such diseases of the joints are often materially benefited by the patient's going to the seaside and bathing, is a fact which cannot be doubted, whatever may be the mode of explaining the benefit thus obtained. I fully believe that sea-air and sea-bathing have a beneficial influence over scrofulous diseases of the joints; but probably their effects are produced on the part through the medium of the constitution, and they should only be recommended as an auxiliary plan, to be adopted in conjunction with other still more efficacious measures.

Every one is well acquainted with the efficacy of friction in exciting the action of the absorbents. To this principle we are to impute the great benefit which arises from what is termed *dry rubbing*, in cases of white-swellings. This kind of friction is performed by the mere hands of an attendant, without using at the same time any kind of liniment, or other application whatsoever, excepting sometimes a little flour, or powdered starch, and the rubbing is continued several hours every day. At Oxford many poor persons earn their livelihood by devoting themselves to this species of labour, for which they are paid a stipulated sum per hour. This practice, however, is chiefly advantageous in the chronic stage of white-swelling, arising from inflammation of the synovial membrane.

I look upon all mere emollient applications, such as fomentations and poultices, as quite destitute of real efficacy, except when great pain or active inflammation is present, and, though they serve to amuse the patient, they ought not to be recommended. That surgeon, who merely strives to please his patient's fancy, without doing any real good to him, in regard to his affliction, may be considered as doing harm, because the semblance of something being done too often hinders other really useful steps from being pursued. The French surgeons are particularly liberal in the praises which they bestow on warm emollient remedies, poultices, steam of hot water, fomentations, &c. and they adduce instances of white-swellings being cured in this manner. But the cases to which they refer were no doubt mere inflammations, and thickening of the synovial membrane; a disease which in general readily yields to several other plans.

The only method of treatment which my own personal experience enables me to recommend for scrofulous white-swellings in a chronic state, consists in keeping up a discharge from the surface of the diseased joints. The opportunities which I have had of observing the effects of blisters, and caustic issues, rather incline me, however, to prefer the former to the latter. I have seen great good derived from both; but more from blisters than the other kind of issue. There are instances in which I should employ vesicating applications; there are others in which I should prefer making an eschar with caustic. In particular individuals blisters create so much irritation, heat, fever, and suffering, that a perseverance in them would be rashness.

The blister should always be large. Many surgeons, instead of following Mr. Crowther's plan, prefer blistering, first one side of the joint, and then the other, alternately, for a considerable length of time. "Blisters (says Mr. Latta) may be put upon each side of the patella, and ought to be of such a size and shape as to cover the whole of the swelling on the inside, from the hinder part of the joint, at the edge of the hollow of the thigh, to the edge of the patella, over the whole extent of the swelling above and below. As soon as the blister is taken off from one side, it ought to be applied to the other, and thus repeated, alternately, until both swelling and pain be completely removed. When this is the case, the patient ought to be directed to rub the joint well with a liniment, composed of half an ounce of camphor, dissolved in two ounces of oil, with the addition of half an ounce of spir. sal-ammon. caust. or, as it is now called, liquor ammoniæ. This is to be used three times a day; and in this way, (continues Mr. Latta) I have successfully treated many cases of white-swellings." (*Syst. of Surgery, Vol.* 1, *chap.* 6.)

In the beginning, caustic issues are even more painful than blisters; but they afterward become more like indolent sores, and are more easily kept open for a length of time than blisters. Such issues are commonly made on each side of the diseased joint, and of about the size of a half crown. The manner of making the eschars, and keeping these issues open, has been already explained. (See *Issue.*)

The question has been contested, among surgical writers and practitioners, whether blisters and issues produce benefit upon the principle of counter irritation, or in consequence of the discharge which they occasion. They probably operate efficaciously in both ways; for there is no doubt that mere rubefacients possess the power of rousing the action of the absorbents, and they may also modify the vascular action in diseased parts. These applications can obviously only act upon the principle of counter irritation, and they have not been here recommended particularly for white-swellings, because, it seems to me, that whenever some good might be derived from their employment, much more benefit might always be obtained from blisters and issues. This sentiment is confirmed by experience, and we must, therefore, impute a great degree of efficacy to the maintenance of a purulent discharge from the vicinity of the diseased part.

Though my own observations have led me to think issues and blisters as efficient as any means hitherto devised for stopping the progress of scrofulous disease of the heads of the bones, I am far from meaning to say, that such disease can generally be stopped by these or any other remedies, local or general. Mr. Brodie has seldom known any benefit derived from blisters or stimulating liniments; nor has he seen the same degree of good produced by issues in scrofulous cases, as in examples of primary ulceration of the cartilages. Cold evaporating lotions in the early stage of the complaint; perfect quietude of the joint; attention to the patient's health; and riding in a carriage in the fresh air; are the means which this gentleman particularly recommends in scrofulous diseases of the joints. During the formation of abscesses, he approves of fomentations and poultices. (*Pathol. Obs. p.* 242.)

We have noticed the efficacy of friction in exciting the action of the absorbents, by which the thickened state of parts around the affected joint may be considerably lessened, and, on this principle, the utility of dry rubbing arises. We have now to notice the method of producing the same effect by pressure, a plan which yet seems to merit a more extensive trial. I have seen in St. Bartholomew's Hospital, a few cases in which the swelling of the joints was materially diminished, by encircling the morbid articulations with strips of adhesive plaster, applied with moderate tightness.

A somewhat similar plan, though its modus operandi is differently accounted for, appears also to have been tried in France. "J'ai dans quelques occasions (says Richerand) obtenu les plus grands avantages de l'application d'un taffetas ciré autour de l'articulation tuméfiée. On coupe un morceau de cotte étoffe, assez large pour envelopper la totalité de la tumeur; on enduit les bords d'une gomme dissoute dans le vinaigre, et susceptible de la faire adhérer intimement à la peau; on l'applique ensuite de manière que toute l'accès soit interdit à l'air entre lui et les teguments. Lorsqu'au bout de quelques jours on lève cet appareil, on trouve la peau humide, ramollie par l'humeur de la transpiration condensée en goutelettes à la surface interieure du taffetas. Dans ce procédé, on établit un espèce de bain de vapeur autour de l'articulation malade." (*Nosogr. Chir. T.* 3, *p* 175, *Edit.* 2.)

My friend, the late Mr. Clement Wilson Cruttwell, of Bath, sent me a very excellent case, illustrative of the efficacy of treatment by pressure. He remarks that, "After cupping the part, and endeavouring to quiet the inflammation, I used blisters; but they excited such intolerable pain, and produced so great a degree of swelling and inflammation, that I was under the necessity of healing them immediately. After two months strict confinement to bed, and the use of leeches and refrigerant washes, the inflammation having again subsided, and the pain being removed, I again ventured to apply one small blister, and again a similar attack of pain, swelling, and inflammation was produced. The joint became distended with fluid, of which it had always contained a large quantity, and the irritation of the constitution was excessive. By the liberal use of opium I once more succeeded in quieting the disturbance, and, convinced of the hazard of using blisters in such a subject, I applied moderate pressure, by means of a roller, together with a wash, containing a large proportion of spirit, in order to keep up a constant evaporation. The skin, which was before much inflamed, and hard, has become natural and flaccid, the pain has ceased, the swelling has diminished, and I have every prospect of effecting a cure, with the preservation of tolerably free motion in the joint."

Mr. Cruttwell, in a subsequent letter, informed me, that this case got completely well by the treatment with pressure, and had remained so for upwards of six months, under full and free exercise.

This example clearly evinces the impropriety of using blisters in certain constitutions. In some remarks, annexed to the above case, Mr. Cruttwell expresses his conviction, that absolute rest, cold applications, and pressure, would succeed in very many cases, without local counter irritation. Pressure, he adds, succeeds best when fluid is effused, and the disease is indolent; but he is convinced that it may be used with advantage in later stages, when abscesses have formed, and sinuses already exist; and he reminds me how very serviceable continued pressure is to the scrofulous finger-joints of children.

The good effects of pressure in scrofulous cases are confirmed by the observations of Mr. Brodie: when, says he, after several abscesses have taken place, the tendency to suppuration has ceased, and the swollen joint has become diminished, anchylosis is probably disposed to take place. At this period, pressure, by means of strips of linen, spread with soap-cerate, or some other moderately adhesive plaster, and applied in a circular manner round the limb, will be productive of benefit. (*Pathol. and Surg. Obs. p.* 243.)

When the knee is affected, the limb has a tendency to become permanently bent. It must undoubtedly be judicious to prevent this position, by means of splints, which will also serve to prevent all motion of the diseased joint, an object of the very highest importance. Were the disease to end in anchylosis, the advantage of having the limb in a state of extension need scarcely be mentioned.

In cases which commence in the cancellous structure of the heads of the bones, it seems rational to combine, with the local treatment, the employment of such internal remedies as have been known to do good in other scrofulous diseases. "It is to be supposed, (as Mr. Brodie observes) that the air of a crowded city must be more or less unfavourable; and that a residence on the seacoast is likely to be more beneficial than a residence in the country elsewhere. The patient should live on a nourishing, but plain diet; he should be in the open air in summer, as much as he can, without exercising the joint. His mode of life should, in all respects, be regular and uniform." Mr. Brodie has found more benefit derived from the long use of steel medicines than any others, suspending their use, however, and substituting the mineral acids for them, when the formation of abscesses excites febrile action. With such means, in children, he combines the occasional exhibition of mercurial purgatives. (*Pathol. Obs. p.* 245.) In a work, which Mr. Lloyd has just published, it is assumed as a fact, that, in scrofula, there always is more or less disorder of the functions of the digestive organs, and primarily of no other important function. Hence, the regulation of diet, the state of the bowels, and the hepatic secretions, is with this gentleman a principal object ; and, with the latter views, he employs, after Mr. Abernethy's plan, five grains of the blue pill every night, and half a pint of decoct. sars. twice a day, with opening medicines, if necessary, to procure regular daily evacuations. When acidity of the stomach is present, he gives soda, and, when the stomach is weak, cinchona, steel, and mineral acids. (*On Scrofula, p.* 37, *&c.*) However, no doubt can be entertained, that these means, like many others, have no specific power over scrofulous diseases and, like sea-air and sea-bathing, only answer by sometimes improving the state of the constitution. In the local treatment of scrofulous joints, Mr. Lloyd commends quietude of the limb, which is to be confined in a sling, or in splints, the occasional resistance of inflammatory action by leeches, and a diminution of temperature ; poultices when abscesses form ; opening such collections of matter early ; and, after all irritation has ceased, issues, setons, blisters, or the antimonial ointment ; or compression upon Mr. Baynton's plan. (*P.* 152, *&c.*) With respect to opening these abscesses early, Mr. Lloyd differs from many excellent surgeons, especially Dr. Albers, who distinctly states, that it is generally best to allow them to burst of themselves. On this subject, however, great diversity of opinion prevails, and Langenbeck is among the advocates for making an early opening. (*Bibl. B.* 2, *p.* 39.) Hectic symptoms are those which we commonly have to palliate in these cases. When the appetite is impaired, and the stomach will bear bark, this medicine should be given with the aromatic confection. Above all internal remedies, opium claims the highest recommendation, as it at once tends to keep off and relieve a debilitating diarrhœa, which too frequently prevails, at the same time that it alleviates pain and procures sleep. The objection, made against its exhibition on the ground that it increases perspiration, seems exceedingly frivolous, when the above important benefits are taken into consideration.

Too often, however, the terrible disease of which we are now treating, baffles all human skill and judgment, and the unhappy patient's health having declined to the lowest state, he is necessitated to submit to amputation, as the only chance of preserving life. It has been explained in speaking of *Amputation*, that the condition of the patient's health, and not of the diseased joint, forms the principal reason for recurring to the severe operation of removing the limb. If the patient's constitution be equal to a longer struggle, no man can pronounce that every prospect of saving the limb is at an end. Many diseased joints, apparently in the most hopeless condition, frequently take a favourable turn, and, after all, allow the limb to be saved.

The proposal of cutting out diseased joints, has been considered in the article *Amputation*.

Disease of the Hip-joint.—This complaint is very analogous in its nature to the white-swelling of other articulations. In the same way as the latter disorder, it seems probable, that the disease of the hip has its varieties, some of which may be connected with scrofula, while others cannot be suspected to have any concern with it. Mr. Brodie's investigations lead him to believe, however, that the disease is of that nature, in which the first change is disease and ulceration of the cartilages. The present complaint is most frequently seen in children under the age of fourteen ; but, no age, no sex, no rank, nor condition of life is exempt from the possibility of being afflicted, so that though children form a large proportion of those subjects, who are attacked ; yet the number of adults, and even of old persons, is considerable.

The approach of the disease of the hip-joint is much more insidious, than that of a white-swelling. Some degree of pain always precedes the latter affection ; but, the only forerunner of the former is frequently a slight weakness, and limping of the affected limb. These trivial symptoms are very often not sufficiently urgent to excite much notice, and, when observed by superficial practitioners, are commonly neither understood, nor treated according to the dictates of surgical science. As there is, also, sometimes an uneasiness in the knee, when the hip is affected, careless practitioners frequently mistake the seat of disease, and I have many times seen patients, on their entrance into an hospital, having a poultice on their knee, while the wrong state of the hip was not at all suspected.

This mistake is extremely detrimental to the patient, not on account of any bad effect, resulting from the applications so employed ; but, because it is only in the incipient period of the complaint, that a favourable prognosis can be made. In this stage of the disease, mere rest and repeated topical bleeding, will do more good in the course of a fortnight, than large painful issues will afterward generally accomplish in the long space of a twelvemonth.

The symptoms of the disease of the hip-joint, when only looked for in the situation of that articulation, are not very obvious to the surgical examiner. Though, in some instances, the attention of the surgeon is soon called to the right situation of the disease, by the existence of a fixed pain behind the trochanter major ; yet, it is too often the case, that mere pain about an articulation, entirely destitute of visible enlargement and external alteration of colour, is quite disregarded, as a complaint of no importance in young subjects, and as a mere rheumatic, or gouty affection, in adults. Patients frequently complain of their most painful sensations being in the groin, and all accurate observers have remarked, that, in the hip disease, the pain is not confined to the real seat of disease, but shoots down the limb, in the course of the vastus externus muscle to the knee.

The pain, says Mr. Brodie, is at first trifling, and only occasional; but, it afterward becomes severe and constant. It resembles a good deal the pain of rheumatism, since it often has no certain seat. As the disease advances, the pain becomes exceedingly severe, particularly at night, when the patient is continually roused from his sleep by painful startings of the limb. Sometimes he experiences a degree of relief in a particular position of the joint, and no other. As the pain increases in intensity, it becomes more fixed. In the greater number of instances, it is referred both to the hip and knee, and the pain in the latter joint is generally the most severe. At other times, there is pain in the knee, and none in the hip. A boy, in St. George's hospital, complained of pain in the inside of the thigh near the middle; and another patient referred the pain to the sole of the foot. Wherever the pain is situated, it is aggravated by the motion of the joint, and especially by whatever occasions pressure of the ulcerated cartilaginous surfaces against each other. (*Brodie's Pathol. Obs. p.* 139.)

The early symptoms of disease in the hip-joint are only strongly delineated to such practitioners, as have acquired the necessary information relative to this part of surgery, from careful study and extensive experience.

We shall next trace those characters of the present disease, which serve to denote its existence.

It is a curious circumstance, that when the functions of a limb are obstructed by disease, the bulk of the member generally diminishes, and the muscles become emaciated. Nearly as soon as the least degree of lameness can be perceived, the leg and thigh have actually wasted, and their circumference has diminished.

If the surgeon make pressure on the front of the joint, a little on the outside of the femoral artery, after it has descended below the os pubis, great pain will be experienced.

"Soon after the commencement of the complaint, (as Mr. Brodie remarks,) the hip-joint is found to be tender, whenever pressure is made on it either before or behind. The absorbent glands become enlarged, and occasionally there is a slight degree of general tumefaction in the groin." The same gentleman has also adverted to the curious circumstance of there being in some cases a tenderness of the parts, to which, though not diseased themselves, the pain is referred from sympathy with the disease of the hip. This occurrence he has observed in the knee several times, and in one instance in the course of the peronæal nerve. He has also seen a slight degree of puffy swelling of the knee in a case, in which pain was referred to this joint, in consequence of disease of the hip. (*P.* 142, 143.)

The limping of the patient is a clear proof, that something about the limb is wrong, and, if such limping cannot be imputed to diseased vertebræ, or some recent accident, and if, at the same time, the above-mentioned emaciation of the limb exists, there is great cause to suspect, that the hip is diseased, particularly when the pain is augmented by pressing the front of the acetabulum.

Diseased vertebræ, perhaps, always produce paralytic affection of both legs at once, and they do not cause painful sensations about the knee, as the hip disease does.

The increased length of the limb, a symptom that has been noticed by all practitioners since De Haen, is a very remarkable and curious occurrence, in the early stage of the present disease. This symptom is easily detected by a comparison of the condyles of the os femoris, the trochanter major, and malleoli, of the diseased limb, with those parts of the opposite member, taking care that the patient's pelvis is evenly situated. The thing is the more striking, as the increased length of the member is frequently as much as four inches. The rationale of this fact, John Hunter used to explain by the diseased side of the pelvis becoming lower than the other. (*Crowther, p.* 266.) The same thing had also been noticed by Falconer, (*On Ischias, p.* 9) long before the period, when Mr. Crowther printed his second edition.

It is easy (says Mr. Brodie,) to understand how the crista of one ilium becomes visibly depressed below the level of the other, when the position is remembered, in which the patient places himself when he stands erect. "He supports the weight of his body upon the sound limb, the hip and knee of which are in consequence maintained in the state of extension. At the same time, the opposite limb is inclined forward, and the foot on the side of the disease is placed on the ground considerably anterior to the other, not for the purpose of supporting the superincumbent weight, but for that of keeping the person steady, and preserving the equilibrium. Of course, this cannot be done, without the pelvis on the same side being depressed. The inclination of the pelvis is necessarily attended with a lateral curvature of the spine, and hence one shoulder is higher than the other, and the whole figure in some degree distorted." (*Pathol. Obs. p.* 146.) These effects, says Mr. Brodie, are in general all removed by the patient's lying in bed a few weeks, except when the deformity has continued a long time in a young growing subject.

In justice to the memory of the late respected Dr. Albers, of Bremen, I ought here to mention, that he appears in his work on Coxalgia, to have first pointed out the deformity of the spine in this disease, and the reason of such change, the tenor of his observations upon this point agreeing with those subsequently made by Mr. Brodie.

An appearance of elongation of the limb is not exclusively confined to the early stage of the morbus coxarius: it may attend other cases. I remember seeing in one of the wards of St. Bartholomew's Hospital, a little girl, with a diseased knee, whose pelvis was considerably distorted in this manner, so that the limb of the same side appeared much elongated. Her hip-joint was quite sound. This case was pointed out to Mr. Lawrence and myself by Mr. Cother, of Gloucester.

Volpi, Albers, and several other foreign writers, point out the fact, that the early stage of this disease is sometimes attended with an appearance of elongation, sometimes with that of a shortening of the limb. An explanation of the circumstance is given by Mr. Brodie, as follows: "In a few cases, where the patient is in the erect position, it may be observed, that the foot, which belongs to the affected limb, is not inclined more forward than the other, but the toes only are in contact with the ground, and the heel raised, at the same time that the hip and knee are a little bent. This answers to the patient the same purpose of enabling him to throw the weight of his body on the other foot; but it produces an inclination of the pelvis in the opposite direction. The crista of the ilium is higher than natural, and there is an apparent shortening, instead of elongation of the limb on the side of the disease." (*Pathol. and Surg. Obs. p.* 147.)

Mr. Ford has very accurately called the attention of surgeons to the alteration, with respect to the natural fulness and convexity of the nates, that part appearing flattened, which is usually most prominent. The glutæus magnus becomes emaciated, and its edge no longer forms so bold a line, as it naturally does at the upper and back part of the thigh, in the sound state of the limb.

Although this symptom, in combination with others, is of importance to be attended to, it has been explained by Mr. Brodie, that "it is not in itself to be regarded, as a certain diagnostic mark of disease in the hip; since, in its early stage, this symptom is wanting; and it is met with in other diseases, in which the muscles in the neighbourhood of the hip are not called into action, although the joint itself is unaffected. (See *Medico-Chir. Trans. Vol.* 6, *p.* 322.)

Though there may be more pain about the knee than the hip, at some periods of the malady in its incipient state, yet the former articulation may be bent and extended, without any increase of uneasiness; but, the os femoris cannot be moved about, without putting the patient to immense torture.

The patient soon gets into the habit of bearing the weight of his body chiefly upon the opposite limb, while the thigh of the affected side is bent a little forward, that the ground may only be partially touched with the foot. This position is found to be the most comfortable, and every attempt to extend the limb occasions an increase of pain.

This is the first stage of the disease, or that which is unaccompanied with suppuration.

The symptoms which precede the formation of pus, vary in different cases, according as there is acute, or chronic inflammation present. When the diseased joint is affected with acute inflammation, as generally happens, the surrounding parts become tense and extremely painful; the skin is even reddish; and symptoms of inflammatory fever prevail. When the severity of the pain abates, a swelling occurs in the vicinity of the joint, and a pointing quickly follows. In this stage startings and catchings during sleep are said to be among the most certain signs of the formation of matter. "The shortening of the limb," says Mr. Brodie, "which usually takes place in the advanced stage of the disease, is usually, but not always the precursor of abscess. The formation of matter is also indicated by an aggravation of the pain; by more frequent spasms of the muscles, by a greater wasting of the whole limb, and by the circumstance of the thigh becoming bent forward, and being incapable of extension," and by the pulse becoming quick, the tongue furred, and the whole system being in a state of preternatural excitement. "The abscess usually shows itself in the form of a large tumour over the vastus externus muscle; sometimes on the inside of the thigh, near the middle; and occasionally two or three abscesses appear in different parts, and burst in succession." (*Brodie's Pathol. Obs. p.* 152.)

We have noticed the commonly lengthened state of the limb, in the first periods of the hip disease. This condition is not of very long duration, and is sooner or later succeeded by a real shortening of the affected member. The foot may be turned inwards; but, as Mr. Brodie observes, if left to itself, it is generally turned outwards. In other cases, the limb is shortened; the thigh is bent forwards; the toes are turned inwards, and do not admit of being turned outwards; (*Pathol. Obs. p.* 148;) and all the symptoms of a luxation of the thigh upwards and outwards may be observed, the head of the bone, indeed, being actually drawn into the external iliac fossa, and carried betwixt the os innominatum and glutæus minimus, which is raised up by it. (See *Richerand Nosogr. Chir. T.* 3, *p.* 171, 172, *Ed.* 2.)

When the retraction is very considerable, it arises from nothing less than an actual dislocation of the head of the thigh-bone, in consequence of the destruction of the cartilages, ligaments, and articular cavity. This retraction sometimes comes on long before any suppuration takes place. The head of the bone is sometimes dislocated, and the disease terminates in anchylosis, without any abscess whatever. However, if suppuration has not taken place, Mr. Brodie believes, it rarely happens, that the limb, after the cure, does not regain its natural degree of mobility. (See *Med. Chir. Trans. Vol.* 6, *p.* 325.)

It is worthy of particular notice, that the head of the bone is always luxated upwards and outwards; and the only exception to this observation, upon record, is a case related by Cocchi, in which a spontaneous dislocation of the thigh-bone, as it is termed, happened upwards, forwards, and a little inwards. (See *Leveillé, Nouvelle Doctrine Chir. T.* 3. *p.* 595.) On a également vu la tete du fémur luxée en dedans et en bas, et placée sur le trou obturateur, mais cette mode de déplacement consécutif, dans lequel le membre est alongé, est infiniment rare. (*Richerand, Nosogr. Chir. T.* 3, *p.* 172.)

The hip disease generally induces hectic symptoms, after it has existed a certain time. In some subjects, such symptoms soon come on; in others, the health remains unaffected a very considerable time.

"The health of the patient (says Mr. Brodie) usully suffers, even before abscesses have formed, from the want of exercise, pain, and particularly from the continued disturbance of his natural rest. I recollect no instance of an adult, in whom abscesses had formed, and who did not ultimately sink exhausted by the hectic symptoms which these induced. Children may recover in this ultimate stage of the disease; but, seldom without a complete anchylosis of the joint." (*Med. Chir. Trans. Vol.* 6, *loco cit.*)

When abscesses of the above description burst, they continue, in general, to emit an unhealthy thin kind of matter for a long time afterward.

With respect to the morbid anatomy of the disease in its incipient state, until lately little was known. A few years ago two dissections related by Mr. Ford were, perhaps, the only ones throwing light upon this point. In one, there was a tea-spoonful of matter in the cavity of the hip joint. The head of the thigh-bone was a little inflamed, the capsular ligament a little thickened, and the ligamentum teres united in its natural way to the acetabulum. The cartilage lining the cotyloid cavity was eroded in one place, with a small aperture, through which a probe might be passed, underneath the cartilage, into the internal surface of the os pubis on one side, and on the other, into the os ischii; the opposite, or external part of the os innominatum showing more appearance of disease, than the cotyloid cavity. In the other instance, the disease was more advanced. These examples are important, inasmuch as they prove that what is commonly called the disease of the hip joint, primarily affects the cartilages, ligaments, and bones, and not the surrounding soft parts, as De Haen and some others would lead one to believe.

As the disorder advances, the portions of the os ischium, os ilium, and os pubis, composing the acetabulum, together with the investing cartilage, and synovial gland, are destroyed. The cartilage covering the head of the os femoris, the ligamentum teres, and capsule of the joint, suffer the same fate, and caries frequently affects not only the adjacent parts of the ossa innominata, but also the head and neck of the thigh-bone. The bones of the pelvis, however, are always more diseased than the thigh-bone, a fact which displays the absurdity of ever thinking of amputation in these cases. Mr. Ford observes, "In every case of disease of the hip joint, which has terminated fatally, I have remarked, that the os innominatum has been affected by the caries in a more extensive degree, than the thigh bone itself." (*Observations on the Disease of the Hip joint, p.* 107.)

Sometimes however, the head and neck of the thigh-bone are annihilated, as well as the acetabulum.

Mr. Brodie has had opportunities of dissecting some diseased hip joints both in the incipient and advanced stage of the complaint. From his observations, it appears; 1st. That the disease commences with ulceration of the cartilages, generally that of the acetabulum first, and that of the femur afterward. 2. That the ulceration extends to the bones, which become carious; the head of the femur diminishing in size, and the acetabulum becoming deeper and wider. 3. That an abscess forms in the joint, which after some time makes its way by ulceration, through the synovial membrane and capsular ligament, into the thigh and nates, or even through the bottom of the acetabulum into the pelvis. Mr. A. Cooper showed Mr. Brodie two specimens, in which the abscess had burst into the rectum. 4. In consequence of the abscess, the synovial membrane and capsular ligament become inflamed and thickened. The muscles are altered in structure; sinuses are formed in various parts, and, at last, all the soft parts are blended together in one confused mass, resembling the parietes of an ordinary abscess. (*Brodie, in Medico-Chir. Trans. Vol.* 4, *p.* 246, 247.)

Such are the beginning and progress of the ordinary disease of the hip joint; but, it is admitted by Mr. Brodie, that there are other scrofulous cases, in which the mischief begins in the cancellous structure of the bones, and also other instances, which consist in chronic inflammation and abscesses of the soft parts in the neighbourhood of the hip. (*Op. cit. Vol* 6, *p.* 326.)

External violence; lying down on the damp ground in summer time; and all kinds of exposure to damp and cold; are the causes to which the disease has sometimes been referred. No doubt, scrofula has, frequently, some concern in its origin; but, often, no rational cause is assignable for the complaint.

Treatment of the disease of the Hip Joint.—The writings of Hippocrates, Celsus, Cælius Aurelianus, &c. prove, that the ancients treated the present disease much in the same way, as it is treated by the moderns. Forming an eschar, and keeping the sore open; topical bleeding; cupping; fomenting the part, &c. were all proceedings adopted in the earliest periods of surgery. Drs. Charlton, Oliver, and Falconer, have extolled Bath water, as a most efficacious application to diseased hip joints, previous to the suppurative stage. However, had not their accounts been exaggerated, all patients of this kind would long ago have flocked to Bath, and the surgeons in other places would never have had further occasion to adopt a more painful mode of treatment. The plan pursued at Bath, is to put the patient in a warm bath, two or three times a week, for fifteen or twenty-five minutes.

In the first stage of coxalgia, the late Dr. Albers, however, had a very high opinion of warm bathing, fomentations with decoctions of herbs, and of bathing in mineral waters and the sea. But, though he commenced the treatment with the frequent use of the warm bath, and continued the plan a long while, it is to be remarked, that he also combined with it an issue. After the patient had been in the bath a period not exceeding half an hour, he was taken out, and his whole body well rubbed with flannel. It appears to me, that one objection to this practice must be the considerable disturbance occasioned by moving the patient in this manner every morning; for if it be true, that most of these diseases commence in the cartilages of the joint, all motion of the limb must be particularly injurious.

In the early period of the disease, entire rest, the application of fomentations, and the employment of topical bleeding, particularly cupping, are highly proper. Such practice, also, is invariably judicious, whenever the case is attended with symptoms of acute inflammation. When the fomentations are not applied, the lotio aquæ lithargyri acetati may be used.

This method of treatment ought never to be employed, unless manifest signs of active inflammation be present. When no such state exists, this plan can only be regarded as preventing the adoption of a more efficacious one, and, therefore, censurable.

"Where the cartilages of the hip are ulcerated (says Mr. Brodie,) the patient should in the first instance, be confined to a couch, if not to his bed; and if the disease is far advanced, the limb should be supported by pillows properly disposed, so as to favour the production of an anchylosis, by allowing it to vary as little as possible from one position." (See *Medico-Chir. Transs. Vol.* 6, *p.* 335.)

Quibus diuturno dolore, says Hippocrates, *ischiadico vexatis coxa excidit, iis femur contabescit et claudicant, nisi urantur.* Forming an eschar, or issue, is the most efficacious plan of treating the disease even now known. A caustic issue seems to me more beneficial than a blister. The depression, just behind and below the trochanter major, is the situation in which surgeons usually make the issue, and the size of the eschar should be nearly as large as a crown-piece. It is generally necessary to keep the issue open a very long time. When the thigh-bone is dislocated, and the patient survives, the case mostly ends in anchylosis.

For the cure of the disease in adults, Mr. Brodie and Dr. Albers have also expressed a preference to caustic issues; but in children, and even in grown-up persons, when the complaint is recent, they agree in thinking blisters capable of affording complete relief. Mr. Brodie states, that in these cases they are more efficacious when kept open with the savine ointment, than repeatedly applied. With respect to issues, he acknowledges, that behind the great trochanter is the most convenient place for them; but he believes that they have more effect, when made on the outside of the joint on the front edge of the tensor vaginæ femoris muscle. Instead of keeping the issue open with beans, Mr. Brodie has found it a more effectual practice to rub the sore, two or three times a week, with the potassa fusa, or sulphate of copper. In particular cases, where the pain was very severe, this gentleman made a seton in the groin over the trunk of the anterior crural nerve, which plan, he says, affords quicker relief, though in the end it is less to be depended upon for a cure, than caustic issues.

In Dr. Albers's work, the great efficacy of issues and blisters in giving immediate relief to the severe pain in the knee, is illustrated by some valuable observations. He speaks also very favourably of the moxa, the employment of which he says is not very painful; a remark, in which Langenbeck concurs. (See *Bibl. B.* 2, *p.* 27.) Dr. Albers, in the hectical stages, recommends opium as highly useful, especially when combined with musk, or camphor.

The occurrence of suppuration makes a vast difference in the prognosis. "The formation of even the smallest quantity of pus in the joint in cases of this disease, in the young person, considerably diminishes, and in the adult almost precludes the hope of ultimate recovery." (*Brodie, in Medico-Chir. Trans. Vol.* 6, *p.* 347.) This gentleman is not much in favour of opening the abscesses early, at least before the joint has been kept for some time perfectly at rest. He has seen no ill consequences arise from the puncture of the lancet remaining open, and he has not found, that in cases of carious joints, the method of evacuating the matter, recommended by Mr. Abernethy (see *Lumbar Abscess*,) is attended with any particular advantage.

Mr. J. Burns, in the second vol. of his "Dissertations on Inflammation," p. 314, has recorded a remarkable instance, in which this joint was affected with that intractable and fatal distemper, the fungus hæmatodes. The case was at first supposed to be the disease, of which we have just been treating in the preceding columns. The limb seemed to be elongated, and issues were employed, without any material benefit. The upper part of the thigh swelled, while the lower wasted away. The patient lost his appetite, had a quick pulse, and passed sleepless nights. The part was rubbed with anodyne balsam and laudanum given every night; but, these means were only productive of temporary benefit. After some months, a difficulty of making water came on, which ended in a complete retention. It being found impracticable to introduce a catheter, and a large elastic tumour, supposed to be the distended bladder, being felt within the rectum, a trocar was pushed into the swelling. A good deal of bloody fluid was thus discharged. Afterward a considerable quantity of high-coloured fetid urine continued to escape from the urethra. In about a week after this operation, the patient died.

On dissection, Mr. Burns found the hip-joint completely surrounded with a soft matter resembling brain, enclosed in thin cells, and here and there other cavities, full of thin bloody water, presented themselves. The acetabulum and head of the os femoris were both carious. The muscles were quite pale, and almost like boiled liver, having lost their fibrous appearance. The same kind of substance was found in the pelvis, and most of the inside of the affected bones was carious. Large cells, containing bloody water, were observed in the diseased substance, and it was into one of these cavities that the trocar had entered, when the attempt was made to tap the bladder. *Gil. Budæus, De Curandis Articularibus Morbis, 12mo. Paris, 1539. J. G. Widdmann, De Genuum Structura eorumque Morbis, Helmstad,* 1744 (*Haller, Disp. Chir. 4, 489.*) *Ford's Observations on the Disease of the Hip joint, to which are added, some remarks on White-Swelling, 8vo. Lond. 1794. Doerner, De Gravioribus quibusdam Cartilaginum Mutationibus, 8vo. Tubingæ, 1798. Crowther on White-Swelling, &c. Edit. 2, 1808. J. Burns on Inflammation, Vol. 2, p. 311. Wm. Falconer, A Dissertation on Ischias, and on the Use of the Bath Waters as a Remedy, 8vo. Lond. 1805. Russel on Morbid Affections of the Knee, 8vo. Edinb. 1802. H. Park, An Account of a New Method of treating Diseases of the Joints of the Knee and Elbow, 8vo. Lond. 1783. Also H. Park and P. F. Moureau, Cases of the Excision of Carious Joints; with Obs. by Dr. J. Jeffray, 12mo. Glasg. 1806. J. A. Albers, Abhandlungen über die Coxalgie, oder das sogenannte freywillige Hinken der Kinder, 4to. Wien. 1807. This work includes many valuable remarks, but owing to the crowded state of this edition, it has been impossible to do his merit sufficient justice. G. Wirth, De Coxalgia, 12mo. Wiceb. 1809. Paletta, Adversaria Chir. Prima, 4to. Hey's Practical Observations in Surgery, p. 354, &c. Edit. 3. Boyer, Traité des Maladies Chir. T. 4, Paris, 1814. Reimarus, De Tumore Ligamentorum circa articulos, Fungo articulorum dicto, Leydæ, 1757. Brambilla, in Acta Acad. Med. Chir. Vindob. T. 1. Brodie's Pathological Researches, respecting the Diseases of Joints, in Vol. 4. 5, and 6 of the Medico-Chirurgical Transactions. Also his Pathological and Surgical Observations on the Joints, 8vo. Lond. 1818; a work containing a great deal of correct and original information. Schreger, Chirurgische Versuche, B. 2, p. 209, &c. Beiträge zur Nosologie der Gelenkkrankheiten, 8vo. Nurnberg, 1818. J. N. Rust, Arthrokakologie, oder über die Verrenkungen durch innere Bedingung, 4to. Wien. 1817. A publication of great merit. Dr. Tomaso Volpi, Abhandl. über die Koxalgie, aus dem Ital. übersetzt von Dr. P. Heineken. The original I have not seen, but the translation contains copious extracts from the prize essay, which I drew up some years ago, with additional observations and cases. Richerand's Nosogr. Chir. T. 3, p. 170, &c. Ed. 4. Langenbeck, Neue Bibl. B. 2, p. 337. G. Gotz, De Morbis Ligamentorum 4to. Berol. 1799. Delpech, Précis Elément. des Mal. Chir. T. 2, p. 377, T. 3, p. 194, p. 470, p. 711, &c. Paris, 1816. H. Mayo, on an acute Form of Ulceration of the Cartilages of Joints, in Med. Chir. Trans. Vol. 2, p. 104. J. Wilson, Lectures on the Structure and Physiology of the Skeleton, and Diseases of the Bones and Joints, 8vo. Lond. 1820. E. A. Lloyd, A Treatise on the Nature, &c. of Scrofula, 8vo. Lond. 1821. The two last publications deserve attentive perusal.*

JUGULAR VEIN, how to bleed in. See *Bleeding.*

JUGULAR VEIN, INTERNAL, WOUNDED. Dr. Giraud cursorily mentions a case, in which a French surgeon, at the military hospital of Toulouse, early in the year 1814, passed a ligature round the trunks of the common carotid artery and internal jugular vein. Both these vessels had been wounded by a musket-shot. On the sixth day from the application of the ligature, nothing unfavourable had occurred; but the final result of the case is not related. (See *Journ. Générale de Med. &c. par Sedillot.*)

K.

KALI. See *Potassa.*

KERATONYXIS. The term, *keratonyxis,* derived from κέρας, a horn, and νύξις, a puncture, is employed by the professors in Germany to denote the operation of couching performed through the cornea, or horny coat of the eye, the opaque lens being in this manner sometimes depressed, sometimes broken piecemeal, and in other instances, merely turned, so as to place its anterior and posterior surface in the horizontal position. The latter method is what the German surgeons particularly imply by the phrase *reclination.* See *Cataract.*

KNEE, DISEASES, AND INJURIES OF THE. See *Dislocations; Fractures; Gunshot Wounds; Joints, &c.*

L.

LACHRYMAL ORGANS, *Diseases of the.* The lachrymal gland cannot be said to be a part which is frequently the seat of disease. Richerand has seen no instance of an inflammation of this gland, unless by this expression be implied cases in which all the contents of the orbit are more or less affected. (*Nosogr. Chir. T* 2, *p.* 32.) I believe that the surrounding cellular substance is more frequently attacked with inflammation and suppuration, than the gland itself. According to Professor Beer, (*Lehre von den Augenkr. B.* 1, *p.* 349,) true idiopathic inflammations of the lachrymal gland are very rare, and he declares, that in the course of a practice of twenty-seven years, he has but seldom met with them. On this point he differs from Schmidt, who fancied that he had often had under his care cases of this description, in gouty and scrofulous subjects. (*Ueber die Krankh. des Thranenorgans, p.* 134.) When the lachrymal gland is attacked with inflammation, its secretion, far from being augmented, as Richerand describes, is always considerably lessened, and therefore one of the earliest symptoms is an uneasy dry state of the eye, the secretion from the meibomian glands, and mucous membrane of the eyelids, not being alone sufficient for keeping the eye duly moist and lubricated. This state is succeeded by a throbbing acute pain in the temple, shooting to the eyeball, forehead, upper and lower jaws, and back of the head. In the mean while, the temporal portion of the upper eyelid becomes swelled, tense, red, and exceedingly tender, the tunica conjunctiva being scarcely at all affected, and merely exhibiting a slight degree of redness and tumefaction towards the outer canthus. However, as the swelling of the gland increases, the eyeball becomes pushed more or less downwards, and inwards towards the nose. But though there is little or no redness, nor any mark of inflammation about the eye, this organ is tense, and extremely tender. The freedom of its movements towards the temple is much lessened in the beginning of the complaint, and, when the tumour has acquired a very large size, is quite destroyed. The impairment of vision is always proportionate to the protrusion of the eyeball, the pupil being diminished, and the iris motionless. The second, or suppurative stage, Beer describes as ushered in by fiery appearances before the eye; an increased displacement of the eyeball; throbbing pain; great increase of the swelling of the upper eyelid, and of the conjunctiva, towards the temple; an annoying sensation of cold, and heaviness in the eye and orbit. Now, under febrile symptoms, rigours, &c. a yellowish point presents itself, either on the reddened portion of the conjunctiva or on the outside of the eyelid, and a fluctuation becomes distinguishable. (*Beer, Lehre, &c. B.* 1, *p.* 350.) Beer speaks of abscesses sometimes forming in the vicinity of the lachrymal gland, and terminating in a small sinus, which communicates with one of the principal excretory tubes, and discharges occasionally a thin limpid fluid. (*Lehre von den Augenkr. B.* 2, *p.* 184.) The experience of this author leads him to consider these sinuses either as a consequence of an unskilfully treated abscess of the upper eyelid, or of a similar neglected affection of the cellular membrane, near the lachrymal gland; or, lastly, of the presence of a portion of the sac of a burst encysted tumour. According to Mr. Travers, the lachrymal gland often suppurates in children, and occasions an excessive swelling above the upper eyelid, depressing the tarsus so as completely to conceal the eye. The abscess, he says, may be conveniently opened, and discharged beneath the eyelid. (*Synopsis of the Diseases of the Eye, p.* 228.) With respect to the treatment of any local inflammation in and about the lachrymal gland, the best means of relief would be leeches, fomentations, emollient poultices, and other common antiphlogistic remedies. In the suppurative stage, Beer recommends mixing with the poultice a good deal of hemlock.

The lachrymal gland is subject to scirrhous enlargement, and, in cases of carcinoma of the eye, it is one of the parts in which a return of the disease is apt to occur. Hence, it is now generally considered right to remove it as soon as the eyeball has been taken away. (See *Eye.*) Sometimes the gland is primarily affected, and Guerin removed one in the state of scirrhus, and so much enlarged, that the eye was entirely covered by it. This operation was performed with such dexterity, that the external straight muscle was not at all injured. Mr. Travers has also removed a scirrhous and enlarged lachrymal gland. The vision of the eye had suffered considerably during the growth of the tumour. The only deformity after the operation, was a slight prolapsus of the eyelid. This gentleman recommends operations of this kind to be always done, if possible, beneath the eyelid. (*Synopsis, &c. p.* 228.)

The caruncula lachrymalis is liable to chronic induration and enlargement, constituting the disease already spoken of in a foregoing part of this work, under the name of *Encanthis,* of which there is also a scirrhous, carcinomatous, or malignant form, quickly extending its effects to the eyeball, and the adjacent thin bones of the orbit. (*Beer, Lehre von den Augenkr. B.* 2, *p.* 188.)

From these subjects, I proceed to consider the diseases of the excreting parts of the lachrymal organs; cases which, though of the most various natures, were formerly all confounded together under the title of *fistula lachrymalis,* and it is only within the last few years, that these complaints have been subjected to the same principles and distinctions, which are conceived to be highly useful in other branches of surgery. As Mr. M'Kenzie has judiciously remarked, the consequence of not distinguishing the different diseases of the excreting parts of the lachrymal organs from each other, has been an attempt to discover some single successful method of curing them all. "Now, there is no one method of treatment by which this can be accomplished; and hence it is, that the several remedies which have been proposed, being eminently successful in one or other of these diseases, but not adapted to all the rest, have at different times been held in such various degrees of estimation." (*On Diseases of the Lachrymal Organs*, p. 10, 8vo. *Lond.* 1819.) And an intelligent critic observes, that in lachrymal diseases, obstruction of the nasal duct appears to be almost the only circumstance against which the treatment recommended by the surgeons of France and England, has been directed. "On sait qu'au rétrécissement ou à l'oblitération du canal nasal produits par une cause quelconque, est due, dans presque tous les cas, la maladie qui nous occupe; soit que, restées intactes, les parois du sac présentent une tumeur lachrymale, d'ou les larmes refluent continuellement sur les joues, à travers les points lachrymaux: soit qu'en partie detruites et ulcérées, ces parois présentent une fistule, qui offre aux larmes un passage contre nature, sans cesse entretenue par elles; en sorte que ces deux états, la tumeur et la fistule, sont presque toujours des degrés différens d'une même affection, et que le traitement qui convient à l'une repose sur les mêmes bases que celui indiqué dans l'autre." (*Œuvres Chir. de Desault, T.* 2, *p.* 120.) It is evident from the writings of Pott and Ware, that even these authors considered the obstruction of the nasal duct, as the foundation of all the train of varied symptoms presented by the excreting lachrymal organs. "An obstruction in the nasal duct is most frequently the primary and original cause of the complaint." "The seat of this disease is the same in almost every subject," says Mr. Pott (*Obs. on the Fistula Lachrymalis;*) and Mr. Ware, in his observations on the same disease, sets out with the same assumption. Now, obstruction of the nasal duct is an occasional consequence merely of inflammation of the excreting lachrymal organs; in most of their diseases, obstruction of the nasal duct has no part; and one might, with as much propriety, treat all the affections of the bladder and urethra, by the dilatation of the latter part, as treat all the diseases of the excreting lachrymal organs, by dilating the nasal duct. The false assumption in question has led to most erroneous treatment. For instance, in blennorrhœa of the sac, and in hernia of the sac, though in both these diseases the nasal duct is patent, the common treatment in this country is to open the sac by the knife, and thrust down a style, or some other instrument into the nose; thus destroying the organization of the parts which are affected merely with a gleety secretion in the one case, and with extreme relaxation in the other. Suppose (says the same critical writer) that some charlatan should make oath at the Mansion-House, that he had cured fifty or a hundred cases of gonorrhœa by opening the urethra in the perinæum, and passing a bougie through that tube, from behind forwards, who would approve of such an operation? Yet the laying open of the lachrymal sac, and thrusting a probe down into the nose, when the nasal duct is either perfectly patent, or at the most, slightly tumid from inflammation, is neither less preposterous, nor less cruel. (See *Quarterly Journ. of Foreign Medicine Vol.* 1, *p.* 293.) Indeed, it is somewhat surprising, that errors of this kind should have prevailed so long, particularly as experience had taught Mr. Pott, that slight cases might be benefited by the simple employment of a vitriolic collyrium; a fact which ought to have convinced him, that the disease did not always depend upon obstruction of the nasal duct. It is curious, therefore, that he did not fully see this mistake; for, that he knew of these diseases having great variety, is evident from the following remark: As the state and circumstances of this disease are really various, and differ very essentially from each other, the general custom of calling them all by the one name of fistula lachrymalis is absurd." I believe, that one great cause of deception has been the fact, that, though laying open the lachrymal sac, and the introduction of instruments down the nasal duct, have been frequently practised, when milder plans would have answered every purpose, yet a cure has often followed the practice, and thus confirmed the supposition of relief having been effected by the removal of the imaginary obstruction in the nasal duct. Thus the late Mr. Ramsden, of St. Bartholomew's, with whom I served my apprenticeship, always followed the common plan of passing a probe down the nasal duct, and letting the patient keep a piece of bougie, or a style, in the part for two or three months afterward; and I scarcely recollect an instance in which he failed to accomplish a cure, though I have no doubt that the same benefit might sometimes have been obtained without any operation at all. And a discerning practitioner should never forget that, if no permanent obstruction exist in the nasal duct, a cure will generally follow, on the subsidence of inflammation, and a change taking place in the action of the parts, whether a probe, style, cannula, bougie, or seton, be employed, or not.

Erysipelas of the Parts covering the Lachrymal Sac.—Beer considers it highly necessary that this case should be discriminated from inflammation of the sac itself, which is often but little affected, and this even when an abscess forms. Unless the true nature of the disease be comprehended, the surgeon is apt to suppose, that the matter is in the sac itself, and believes that, when he makes an opening, he is puncturing that receptacle, whereas he is in reality, merely dealing with a superficial abscess of the integuments. Nor, as Beer has observed, is the mistake free from ill consequences; for, imagining that the wound is made into the sac, the surgeon pokes about with his probe so long, that a good deal of unnecessary pain and inflammation is produced. According to the same author, the case is not very frequent, and is mostly met with in scrofulous subjects, who have had for a considerable time a blennorrhœa of the lachrymal sac. The inflammation partakes of the usual characters of erysipelas, and commonly extends to the eyelids, particularly the upper one. The absorption and conveyance of the tears into the lachrymal sac are interrupted, because the inflammation constantly affects the lachrymal ducts and papillæ, the latter appearing considerably shrunk. When the inflammation spreads over the side of the face, Beer says there is usually a discharge of thin mucus from the nose; and when the affection extends more deeply to the anterior portion of the lachrymal sac, as may easily happen when the case is neglected, or treated in its first stage with stimulating applications, a bean-shaped, circumscribed, hard, painful tumour may be felt, or is even denoted by its very red appearance. The puncta lachrymalia are now completely closed, the papillæ shrivelled up, and the nostril on the affected side very dry and tender.

If in the first stage of the disorder, the lachrymal papillæ and canals have not been too violently affected, the former parts expand again, and the absorption of the tears recommences with the second stage. But, at this period, according to the observations of Professor Beer, a good deal of mucus is secreted from the caruncula lachrymalis and Meibomian glands, and collects and glues the eyelids together, especially during sleep. At the same time, mucus generally accumulates in the lachrymal sac itself, and may be voided both through the puncta lachrymalia and nasal duct, by gentle pressure. The mucous discharge from the nostril also acquires a thicker consistence. Should the lachrymal papillæ and ducts have suffered more severely in the first stage of the disease, the due absorption of the tears does not begin after the subsidence of the inflammation, and a dropping of them over the cheek, a *stillicidium lachrymarum* frequently continues a long while after the termination of the other symptoms. It depends upon the atony of the lachrymal puncta and ducts, and is very troublesome in cold wet weather. And, when the lachrymal sac itself has been a good deal inflamed in the first stage of the complaint, a large quantity of mucus collects within it in the second stage, and may be discharged by pressure. Sometimes the subcutaneous abscess actually communicates with the cavity of the sac; a case, which Beer terms a spurious fistula of the lachrymal sac, the matter not being formed in that receptacle itself, but getting into it from the external abscess. As the skin is generally rendered very thin, these abscesses near the bridge of the nose usually burst by several openings. Beer remarks, that it is easy to learn, whether the ulceration extends through the lachrymal sac; for when this has happened, the slightest pressure upon the superior part of the sac produces a discharge of pus and mucus from the external opening, and, if the lachrymal canals have already recommenced their functions, the discharge will also be mixed with tears. (See *M'Kenzie on Diseases of the Lachrymal Organs, p.* 22.) The quantity of matter, which flows out, is likewise so copious, that it is evident it could not have been all lodged between the skin and orbicularis palpebrarum muscle, but must have come partly out of the lachrymal sac. The use of a fine probe will remove any doubt which may be left. (*Beer, Lehre von den Augenkr. B.* 1, *p.* 332—35.)

On the subject of the causes of this complaint, the preceding author delivers no remark worthy of notice. In speaking of the prognosis, he observes, that when the case is not neglected, nor wrongly treated in its first stage, and the inflammation has not extended to the lachrymal sac, the prognosis is very favourable; for, after the subsidence of the inflammation, a temporary atony of the lachrymal puncta and ducts, an imperfect conveyance of the tears into the nose, and of course a slight oozing of them over the cheek, most troublesome in cold, wet weather, are the chief inconveniences which remain. But, when the lachrymal sac participates in the inflammation, the prognosis is much less favourable; because, when suppuration takes place, ulceration is apt to form an opening in the front part of the sac, or else, during the second stage, a large quantity of mucus may collect in the sac, and, if not skilfully treated, it frequently ends in a very obstinate blennorrhœa of that part. As Beer observes, this is a case which is often, though quite erroneously, named a fistula lachrymalis. (*B.* 1, *p.* 336.)

The prognosis is also very favourable in the second stage of the complaint, as long as the suppuration is restricted to the integuments, and it is characterized by desquamation and scabbing; but, the case is more serious, when a large collection of matter forms, and particularly when the abscess makes its way into the lachrymal sac. In these last circumstances, an obstinate blennorrhœa from the sac often follows, notwithstanding the fistulous sore be treated in the most skilful manner, and sometimes the matter spreads so far around, as to spoil, and even annihilate, the lachrymal canals, and cause an irremediable dropping of tears over the cheek, during the rest of the patient's life. (*Beer.*)

The suppuration (says Mr. M'Kenzie) may destroy the ligamentous layer of the lower eyelid, and end in the total obliteration of the cavity of the sac. But when the sac is not thus annihilated, and the lachrymal canals are destroyed, it is necessary that the cavity of the sac should be obliterated by artificial means; for otherwise a form of disease will follow, which Beer denominates *hydrops sacci lachrymalis*, and Mr. M'Kenzie, *mucocele*, as will be hereafter noticed.

"In common cases, a piece of folded linen, dipped in cold water, and applied to the parts affected, and the administration of gentle doses of sulphate of magnesia, make up the treatment. In severe cases, it will be found necessary, not only to continue the cold applications, and to open the bowels, but to administer an emetic of tartrate of antimony, to purge freely, and even sometimes to take away blood from the arm." (*M'Kenzie, p.* 24.)

In the second stage, a warm dry air, and a linen compress, are commended, with the exhibition of diaphoretics. In the two first of these means, I confess, that I should place little or no confidence. When the formation of matter cannot be prevented, poultices are to be used. Beer particularly cautions us not to leave the abscess to burst of itself, but to open it immediately a fluctuation can be felt, so as to prevent an ulcerated opening from taking place in the anterior part of the lachrymal sac. And, if the surgeon has not been consulted before such a communication has been established between the sac and subcutaneous abscess, he should avoid all unnecessary disturbance of the parts with probes and syringes, and at most, only wash out the abscess once a day with Anel's syringe, filled with lukewarm water and a little of the vinous tincture of opium. Beer also recommends introducing into the superficial abscess, but not into the sac, a small quantity of lint, dipped in the tincture. If the blennorrhœa of the sac continue, it is to be treated as will be explained in considering the second stage of inflammation of that part.

Inflammation of the Lachrymal Sac.—According to Beer, the symptoms of the first stage of this complaint are as follows: in the corner of the eye, precisely in the situation of the lachrymal sac, a circumscribed, very hard, tender swelling arises, of the shape of a bean, producing a lancinating pain when it is touched, and gradually acquiring considerable redness. The absorption and conveyance of the tears into the lachrymal sac, and thence into the nose, are completely interrupted; the lachrymal papillæ are shrunk; the puncta cannot be seen; and of course the tears fall over the cheek. The nostril on the affected side is at first very moist, but soon becomes perfectly dry, the mucous membrane being a good deal affected. As the inflammation also constantly spreads to the orbicular muscle and integuments in the corner of the eye, the complaint often presents an erysipelatous appearance, extending to the eyelids and down the cheek; but, the circumscribed swelling, caused by the inflamed sac, is still not only capable of being distinctly felt, but even seen. It rarely happens, in cases of common inflammation, that on the change of the first stage into the second, the nasal duct is rendered impervious by an effusion of lymph; but such an occurrence is more frequent where the inflammation is not of a healthy description, and the patient is scrofulous. Under these circumstances, the lachrymal canals may also be permanently obliterated. In weak, irritable constitutions, towards the end of the first stage of the inflammation, a degree of symptomatic fever prevails, with severe headach, great redness and swelling of the whole inner canthus, involving the caruncula lachrymalis, the semilunar fold, the conjunctiva, the edges of the eyelids, and the lachrymal puncta.

Here as in inflammation of every mucous membrane, at the very commencement of the second stage, a copious morbid secretion takes place, and accumulates in large quantity; for, either in consequence of the thickening of the mucous membrane, the adhesion of the sides of the nasal duct together, or there being no mixture of the tears, the secretion within the sac cannot escape either into the nostril, or out of the lachrymal puncta, and consequently it distends in a prodigious degree the anterior side of the sac, where it is uncovered by bone. Hence, the swelling is here very manifest, and a fluctuation may be felt in it, even before the suppurative stage has actually begun. According to Beer, whoever is induced by the fluctuation to open the lachrymal sac at this period, will certainly bring on a very hurtful suppuration of the part, exceedingly likely to render the excreting parts of the lachrymal organs completely unserviceable. At the beginning of the second stage, there is also a morbid secretion from the mucous membrane of the nostril and caruncula lachrymalis. Now not only the swelling of the lachrymal sac increases more and more, the redness acquires a deeper colour, the skin becomes more shining, the fluctuation still more evident; and, at length, in the centre of the tumour formed by the lachrymal sac, a yellowish, soft point presents itself. In this state of things, in order to prevent a true fistula, the surgeon should make an opening in the lachrymal sac, without the least delay; for, if the abscess be left to itself, the pus will at last make a passage for itself through the orbicular muscle and integuments; but it will only be a small fistulous opening, surrounded with callous hardness, and merely capable of letting some of the pus and mucus of the sac escape, so that the thicker part of the matter remains behind, and, consequently, though the swelling diminishes after the formation of a spontaneous opening, it does not entirely subside. A quantity of blood is also remarked to be blended with the discharge from the sac. This last is the case, which Beer denominates *a true fistula of lachrymal sac.* When the abscess bursts of itself, the fistulous opening in the sac is not always exactly opposite the aperture in the skin, and, though there is commonly but one communication with the sac, it sometimes happens, that several small external openings are produced more or less distant from the sac. The diagnosis is easy enough; for, on pressing upon the upper portion of that receptacle, mucus and pus, blended together, are immediately discharged from all the fistulous apertures. After the disease has lasted a good while, it not unfrequently happens, that tears are also voided from the fistulous opening; a circumstance, indicating the restored action of the lachrymal puncta and canals; but, according to Beer, such tears are never duly blended with the mucous and purulent matter. He further remarks, that, when the second period of the second stage, or the suppurative process is over, a morbid secretion of mucus still continues in the third period of the second stage, that secretion becoming whitish, thick, opaque, and only partly resembling pus. As, in conquence of its thickness, and the swelling of the mucous membrane of the nasal duct, the secretion cannot descend into the nose, it collects in the sac, and sometimes pushes off any piece of lint, or plaster, with which the external opening in the sac has been closed. At length, by means of judicious treatment, this third period of the second stage is also brought to a termination; the mucus is secreted again in due quantity; it becomes transparent like white-of-egg, and viscid; but white streaks may be for some time perceived in it. Afterward the mucus becomes thinner, and, if the functions of the lachrymal puncta and ducts are not destroyed, it is thoroughly mixed with the tears. The opening in the lachrymal sac now either heals up of itself, or under skilful treatment; but, in general, a minute fistulous aperture still remains, from which the tears and mucus are occasionally voided, if the passage through the nasal duct be not free. However, if the small fistulous aperture should happen to heal up completely, the mucus and tears accumulate in the sac, and the patient is obliged to press them out through the puncta lachrymalia several times a day.

When the surgeon is consulted early enough, and proper treatment is adopted, Beer sets down the prognosis in the first stage of the inflammation as very favourable. But, if the practitioner be called in later, it will not be in his power completely to disperse the inflammation, and prevent the morbid secretion, and accumulation of mucus in the lachrymal sac; the *blennorrhœa* of this part, of professor Beer, or the *dacryops blennoideus*, of Schmidt; a state, however, which soon gives way to judicious treatment. But, when the case is neglected, or wrongly managed at the period, when the lachrymal sac is violently inflamed, a complete, or partial closure of the nasal duct by adhesive inflammation is apt to be the consequence. And, the same effect may also be produced in the lachrymal canals, in which event, the absorption of the tears is for ever impeded, and the patient must remain the rest of his life afflicted with a stillicidium lachrymarum.

With regard to the prognosis in the second stage of inflammation of the lachrymal sac, Beer considers it as very dubious, on account of the impairment of the functions of the excreting parts of the lachrymal organs; for, says he, no surgeon can exactly know, what may have been the result of the first stage, in relation to the perviousness of the nasal duct and lachrymal canals, and an officious examination of the parts with a probe, for the purpose of obtaining information, would be attended with considerable mischief. However, generally speaking, the prognosis is most hopeful at the first period of the second stage, just when the morbid secretion of mucus is beginning; the suppuration may yet be moderated by right treatment, and the excreting parts of the lachrymal organs preserved. But, if the suppurative stage has already come on, much will depend upon the consideration, whether the matter has been originally formed in the lachrymal sac, has lodged there a good while, and the sac is ready to burst, or whether there is actually an opening in the sac opposite that in the skin, or, lastly, whether the openings do not correspond. In the first case, the suppuration yet admits of being regulated by judicious treatment, and the lachrymal sac can be punctured; but, in the other circumstances, the management of the case is far more difficult, especially when the patient's constitution is not good. However, the surgeon should be careful not to disfigure the patient with a large scar; and the aim should be to prevent atony of the lachrymal puncta and ducts, and a consequent stillicidium lachrymarum. These are the least serious evils to be apprehended from mismanagement; for, if the case be ill-treated, or neglected, in the latter stage of the suppurative process, necessarily attending a fistulous state of the sac, the lachrymal organs may be rendered quite useless, or even entirely destroyed, and the nasal duct obliterated, or obstructed by the effects of caries. In some few instances, indeed, the whole lachrymal sac is destroyed, or will require to be so by art, as will be presently explained. It is always a favourable circumstance when the tears are seen to issue from the fistulous opening with the mucus and pus, as it is a proof that the absorption and conveyance of the tears into the lachrymal sac are established again, and that now the only question is about the state of the nasal duct, which point cannot be determined before the fistula is completely healed, and the third period of the second stage is entirely obviated. (*Beer, Lehre von den Augenkr. B.* 1, *p.* 356—367.)

In the first stage, the indication is to endeavour to resolve the inflammation. "It is, (as Mr. M'Kenzie observes) by combating the inflammation, that we are to cure this disease, and not by attacking merely one, or even several of the symptoms. Dilatation, for instance, by the introduction of probes through the canals into the sac and even into the nose, would only be subjecting the inflamed parts to a new cause of irritation, and might thus produce effects which would render a complete cure difficult, if not impossible." On the contrary, in the first stage, Mr. M'Kenzie joins Beer in praise of antiphlogistic measures; the application of cold lotions to the part; and, in severe cases, venesection and leeches are set down as proper, together with opening and diaphoretic medicines. (*On Diseases of the Lachrymal Organs, p.* 33, 34.)

In the second stage, when resolution is

no longer practicable, emollient applications are the most beneficial, and all debilitating means are to be stopped, by the further use of which an incurable blennorrhœa of the lachrymal sac would be likely to be induced. And, as soon as the sac is so distended with mucus and matter, that the centre of the swelling begins to be soft, and a fluctuation is perceptible, the sac should be freely opened, so as to let its contents have a ready outlet. If, after this evacuation, there should be any deep-seated hardness of the lachrymal sac, Beer recommends the application of a camphorated hemlock poultice. Afterward, the wound in the skin and sac is to have introduced into it a little bit of lint, dipped in the vinous tincture of opium, over which dressing a piece of diachylon plaster may be placed. When, under such treatment, the suppuration diminishes, but a preternatural secretion of mucus yet continues, Beer introduces into the wound every day a piece of lint, on which is spread a little bit of the following ointment: ℞ Butyri recentis insulsi, ℥ss. Hydrargyri Nitrico-Oxydi, gr. x. tutiæ, ptt. gr. vj. M. And, on changing the dressings, some of the following lotion may be dropped into the inner canthus, and injected lukewarm into the sac itself: ℞ Subacetatis Cupri, Potassæ Nitratis, aluminis, ā ā gr. iij.—vj. Camphoræ tritæ grij.—iv Aquæ distillatæ ℥ss. Solve et cola. Liquori colato adde Vini Opii ʒj.—ʒij. Aquæ Rosæ ℥iv. M. Professor Beer makes a mass of the three first articles melted together in equal proportions, and terms it the *lapis divinus*, of which he makes the lotion, and then adds the other ingredients. When, by means of such treatment, the mucous secretion from the sac has been brought into a healthy state, and all the induration has subsided, the period has arrived for the surgeon to think of taking measures for the re-establishment of the passage through the nasal duct, if it should not already have become pervious of itself, which, when the inflammation has been of a healthy kind, and the treatment judicious, very frequently happens. (*Beer, Lehre, &c. B.* 1, *p.* 369—371.)

Chronic Blennorrhœa of the excreting Parts of the Lachrymal Organs.—Mr. M'Kenzie, whose Essay contains a faithful account of Beer's opinions upon the present subject, describes the inflammation, with which this form of disease commences, as seldom considerable, and in scrofulous patients, it is said to be not unfrequently quite disregarded, no advice being taken until the lachrymal sac is much distended with mucus. By means of pressure upon the bean-shaped tumour, caused by such distention of the sac, a quantity of puriform mucus is forced out of the puncta lachrymalia, and overflows the eye; and so far are the lachrymal canals from being obstructed, that, excepting when any return of inflammation happens, they even absorb, and convey the tears into the sac. Pressure, however, will rarely make the contents of the sac pass through the nasal duct, on account of the thickened state of the mucous membrane, and therefore the nostril is generally very dry. "In the course of this tedious disease, the accumulated mucus varies much both in quantity and quality. For instance, the mucus accumulates more rapidly, and is much thicker after a good meal, than at other times. The secretion of it is very plentiful, but thinner than usual, when the patient continues long in a moist cold atmosphere. In this case, the overfilling of the sac takes place so rapidly, that the compression of the orbicularis palpebrarum in the action of winking is sufficient to evacuate the sac through the canals to such a degree, that the whole surface of the eyeball is suddenly overflowed, and the puriform fluid runs down upon the cheek. After the patient remains for a short time in a warm and dry atmosphere, the morbid secretion becomes sparing and ropy. We find, that this chronic blennorrhœa almost completely disappears in many individuals during warm weather, upon which the yet unexperienced patient and the unexperienced surgeon are apt to express a great, but a premature joy, for, on the very first change to cold and wet weather, the disease most frequently returns."

During chronic blennorrhœa, the lachrymal sac is extremely liable to repeated attacks of inflammation, and sometimes a fistula, with a good deal of induration of the surrounding cellular substance, is produced. Mr. M'Kenzie represents this disease as the most frequent of all those to which the excreting parts of the lachrymal organs are liable, and as consisting in inflammation of these organs, modified by scrofula, general debility, disorder of the digestive organs, or other constitutional causes which prolong its second stage. "Even regarded locally, the present disease is seldom a primary affection, but is most frequently excited by catarrhal inflammation of the Schneiderian membrane, or by a long-continued disorder of the Meibomian glands." (*M'Kenzie on Diseases of the Lachrymal Organs, p.* 37—40.)

Scarpa's opinions on the present subject are in some degree peculiar to himself; for he considers the affection of the Meibomian glands and inside of the eyelids, the *puriform palpebral discharge*, as he terms it, as constituting the first degree of all those complaints which have usually gone under the name of fistula lachrymalis; the second degree, or effect, being the tumour of the lachrymal sac; and the third, the fistula, or ulcerated opening in the latter part. Scarpa asserts, that the chief part of the yellow viscid matter, which accumulates in the lachrymal sac, is secreted by the lining of the eyelids, and by the little glands of Meibomius; and that the altered quality of this secretion has a principal share in the cause of the disease. He states, that the truth of this fact may at once be ascertained by everting the eyelids, and especially the lower one of the affected side; and by comparing them with those of the opposite eye.

The former will always exhibit an unnatural redness of the internal membrane, which has a villous appearance all over the extent of the tarsus; while the edge of the lid is swollen, and numerous varicose vessels are distinguishable on it. The follicles of Meibomius are also turgid and prominent, and when examined with a magnifying glass, not unfrequently appear to be slightly ulcerated.

"The villous structure then, which the surface of the internal membrane of the palpebra assumes in these cases, becomes an organ secreting a larger quantity of fluid than usual, resembling viscid lymph, which, as before stated, being mixed with the sebaceous matter, copiously effused from the glands of Meibomius, constitutes the whole of the viscid fluid, with which the eyelids are imbued, and which is continually carried by the puncta lachrymalia into the sac, so as to fill and also frequently distend it, until it forms a tumour.

"If, indeed, the lachrymal sac is emptied of this matter, by means of compression, and the eye and internal surface of the palpebræ are carefully washed, so that none of the glutinous humour, pressed from the sac, may remain upon them, and the eyelids are everted half an hour afterward, the internal surface, especially of the lower one, will be found covered with a fresh effusion of mucus mixed with sebaceous matter, which has evidently not flowed back from the lachrymal sac to the eye, but has been generated between the eye and the palpebræ." Another argument, brought forward by Scarpa, in support of his theory, is, that, if the morbid secretion of the eyelids be retarded, or suppressed, either accidentally or by means of astringent applications, little or none of the viscid secretion collects in the lachrymal sac, or can be forced out of the puncta lachrymalia. He has also constantly observed, that the puriform discharge may be radically cured at its commencement, and before it has induced any flaccidity of the sac by a timely correction of the morbid secretion from the inside of the eyelids, and keeping the lachrymal passages cleansed, by means of injections of simple water through the puncta lachrymalia into the nose. As for the internal membrane of the sac itself, he argues, that its structure does not qualify it for secreting a tenacious unctuous matter, like what is chiefly discharged from it, as it is entirely destitute of sebaceous glands, and can in reality only furnish a thin mucus. However, he admits, that if the sac happen to be inflamed and ulcerated, a turbid matter may issue from it with the tears; but, says he, this matter is true pus, and quite different from the curdy unctuous fluid which takes place in the puriform palpebral discharge. (*On the Principal Diseases of the Eyes, Transl. by Briggs, Ed.* 2. *p.* 3—7.)

The foregoing opinions of Scarpa have not met with universal assent, and though there is probably much truth in them, he may have overlooked too much the possible simultaneous affection of the mucous membrane of the lachrymal sac and nasal duct. To Scarpa's hypothesis, Himly and Flajani have made the following objections: First, that they have observed the fistula lachrymalis, without the least morbid alteration of the eyelids and Meibomian glands. Secondly, that every puriform discharge of the eyelids is not succeeded by a fistula lachrymalis. Lastly, that the fistula lachrymalis is cured by means of the operation alone, without any attention being paid to the morbid state of the eyelids, when it exists. And Mr. Travers also regards Scarpa's account of the origin of the disease, independently of a permanent stricture, as hypothetical; for if founded in fact, the distention of the lachrymal sac, and the regurgitation of the fluid on pressure, would attend every severe lippitudo, or ophthalmia with puriform discharge, which is not the case. If Scarpa's account were correct, Mr. Travers sees no reason why the fluid, once admitted, should be arrested, or regurgitate, instead of passing into the nose, (see also *Nicod. in Revue Med. T.* 1, *p.* 155,) and he thinks there is every reason to believe that the fluid, so discharged, is the proper secretion of the sac, and cases are frequent, in which it is retained and cannot be expressed, owing to strictures both of the lachrymal and nasal ducts. (*Synopsis of the Diseases of the Eye, p.* 360.) Some of the arguments with which Scarpa meets this reasoning, are already anticipated, especially that which refers to the difference between the secretion of the sac itself, and that of the sebaceous glands of the eyelids. Also, in asserting that the origin of the fistula lachrymalis generally manifests itself on the eyelids, before the lachrymal passages are affected, Scarpa declares, that he does not pretend thereby to exclude altogether the possibility of a case, in which the membranes of the nasal duct and lachrymal sac may not be thickened and ulcerated, independently of the disease of the eyelids. That this is the case, I think is evident from the account already delivered in the two first sections of this article, of Beer's opinions, respecting the consequences of inflammation of the integuments and other parts about the inner angle of the eye, as well as respecting the effects of acute inflammation of the lachrymal sac itself. However, Scarpa admits the fact, and the question left is, whether he is right in assigning the morbid secretion from the inside of the eyelids, as the most common cause of the swelling, ulceration, &c. of the lachrymal sac? That every puriform discharge from the eyelids is not followed by fistula lachrymalis, he allows, is unquestionable; and this, he conceives, most probably happens, because the lippitudo has not been entirely neglected, or because the secretion being less dense and viscid than usual, descends freely with the tears into the nose through the lachrymal canals, which are large and pervious. But in the acute stage of the purulent ophthalmia, he asserts that the reason why the discharge is not conveyed into the sac is, that the inflammation and swelling actually close the puncta lachrymalia, and change their direction, so that both the puriform matter and the tears fall over the cheek, and cannot descend into the sac.

As for the instances of cure, without any remedies being applied for the correction of the state of the eyelids, Scarpa deems the argument inconclusive, because particular vices of the constitution, under the use of appropriate internal remedies and a well-regulated diet, disappear, or are transferred to other parts, without the use of topical remedies.

For my own part, I am disposed to believe, that, whether the disease begin in the eyelids, or elsewhere, generally both their lining, and that of the sac and nasal duct are also more or less affected; and, consequently, though Scarpa's theory may not be in every respect satisfactory, nor at all applicable to certain disorders of the excreting parts of the lachrymal organs, the practice, to which his sentiments lead, will, in the generality of cases, which Beer denominates *chronic blennorrhœa*, be highly advantageous.

According to Mr. M'Kenzie, the local treatment of chronic blennorrhœa does not differ essentially from that of inflammation of the excreting parts of the lachrymal organs. But, every possible means must also be employed for improving the general health; for, otherwise all local remedies will be unavailing. In scrofulous cases, particular attention must be paid to diet and mode of living. In weakly persons, the preparations of iron will be highly beneficial; and, when the disease is connected with disorder of the digestive organs, the treatment recommended by Mr. Abernethy is that to which Mr. M'Kenzie expresses a preference. The employment of Anel's syringe and probe are strongly reprobated. "I grant, (says this author,) that the application of certain substances to the mucous membrane affected, is one of the most powerful means, which we possess, of correcting its disposition to chronic blennorrhœa. But, he who believes, that the best manner of applying these substances, is to inject them with Anel's syringe, introduced through the puncta, is lamentably mistaken. He is, in fact, closing his eyes upon what he must know of the functions of the several parts of the lachrymal organs, and is doing that very thing, which is calculated to prolong and exasperate the disease. Except at the time of a smart renewal of the inflammation, the puncta and canals, during this disease, continue in the exercise of their functions. Whatever fluid, therefore, is dropped into the lacus lachrymarum, will be taken up by the puncta, conveyed through the canals, and applied to the whole internal surface of the sac. Even ointments, placed within reach of the puncta, will be absorbed in the same manner. "We ought then first of all to empty the sac by pressure, and, if possible, through the nasal duct into the nose. Having placed the patient upon his back, we drop into the lacus lachrymarum a small quantity of a weak solution of corrosive sublimate. ℞. aq. ros. ℥iv. hydrarg. oxymuriatis grss, grj. Mucil. ʒj. vini opii ℈j. M. After remaining for a quarter of an hour in that position, he ought to rise, but without wiping away any of the collyrium, which may remain. After another quarter of an hour, the eyelids are to be carefully dried, and a little of Janins's ophthalmic ointment applied with a camel-hair pencil to the caruncula lachrymalis and edges of the eyelids. All this is to be carefully repeated twice a day." Professor Schmidt recommends the following collyrium. ℞. Aq. rosæ ℥vj. acid nitrici ℈j. alchoholis ʒj. M. For the removal of the induration over the sac gentle friction, with camphorated mercurial ointment is recommended. And, says Mr. M'Kenzie, if the blennorrhœa depend upon chronic inflammation of the Meibomian glands, the diluted citrin ointment is to be applied every evening at bed-time. (*On Diseases of the Lachrymal Organs, p.* 43, *&c.*) In the first stage of what Scarpa terms the puriform discharge of the palpebræ, when the weeping is incipient, this author states, that a cure may be effected, without dividing the sac, or any other painful operation. His practice consists in restraining the immoderate secretion from the Meibomian glands and internal membrane of the palpebræ, and in cleansing the viæ lachrymales through their whole extent by means of injections of warm water, rendered more active by the addition of a little spirit of wine, and thrown into the puncta lachrymalia every morning and evening; a measure, which, as already stated, is disapproved of by Mr. M'Kenzie, Schmidt, &c. Scarpa considers Janins's ophthalmic ointment, weakened with lard, or fresh butter, as the best application for correcting the morbid secretion of the eyelids. A portion, equal to the size of a barley corn, is to be introduced upon the point of a blunt probe, every morning and evening, between the eye and eyelids, near the external angle, and the edges of the eyelids are to be smeared with it. The eye is then to be shut, and the eyelids gently rubbed, so that the ointment may be distributed upon the whole of their internal surface. A compress and bandage should be applied, and the eyelids kept closed for two hours. At the end of this time, the eye should be washed with the zinc collyrium. When there are superficial ulcerations at the edges of the eyelids, Scarpa applies to them either Janins's ointment, or the unguentum hydrarg. nitrat., and in very obstinate cases, the argentum nitratum itself. If the vessels of the conjunctiva are varicose, he drops into the eye the tinctura thebaica. (*Scarpa, Ed.* 2, *by Briggs, chap.* 1.)

The late Mr. Ware was earlier than Scarpa in pointing out the advantage of making applications to the inside of the eyelids, for the relief of certain forms of disease, usually classed with fistula lachrymalis.

"When an epiphora (says he) is occasioned by an acrimonious discharge from the sebaceous glands on the edges of the eyelids, it must be evident, that injections into the sac will be very insufficient to accomplish a cure, because the sac is not the seat of the disorder. The remedies that are employed must be directed, on the contrary, to the ciliary glands themselves, in order to correct the morbid secretion that is made by them; and for this purpose, I do not know any application that is so likely to prove so effectual as the unguentum hydrargyri nitrati, of the new London Dispensatory, which should be used here in the same manner, in which it is applied in common cases of the psorophthalmy. It will be proper to cleanse the eyelids every morning, from the gum that collects on their edges during the night, with some soft unctuous applications; and I usually advise to apply to them, two or three times, in the course of the day, a lotion composed of three grains of white vitriol, in two ounces of rose or elder-flower water." (*Additional Remarks on the Epiphora.*)

In a modern periodical work may be perused some interesting remarks by M. Nicod, which perfectly accord with the sentiment already expressed, that whatever may be its primary seat, the chronic inflammation is not generally limited to the inside of the eyelids, but extends throughout the membranous lining of the sac and nasal duct, and that this circumstance, in conjunction with the altered and viscid nature of the secretions, accounts for their not readily descending into the nose, but regurgitating through the puncta. M. Nicod also relates cases exemplifying that the ointment applied to the inside of the eyelids actually passes with the matter into the lachrymal sac, and thence into the nose, so as to act upon and cure the chronic inflammation of the sac and nasal duct, as well as that of the Meibomian glands and lining of the eyelids. (See *Revue Medicale Historique, &c. T.* 1, *p.* 156, *8vo. Paris*, 1820.) The proceedings for adoption, when the nasal duct is obstructed, will now be considered.

Obstruction of the Nasal Duct.—That a permanent closure of this canal does not so frequently attend diseases of the lachrymal organs, as writers have generally imagined, must be evident from the remarks already delivered; and also that its perviousness, when interrupted partly by inflammation and thickening of its lining, and partly by the viscid curdy nature of the matter, may generally be restored, without thrusting any probes, tubes, or other instruments down the passage, (measures, more likely, under these circumstances, to do harm than good,) is a fact, which is no longer questionable. The treatment, necessary in such cases, must be already intelligible from what has been said in the preceding sections, the indication being the diminution of the thickened state of the mucous membrane, by means adapted to the acute, or chronic form of the inflammation, and, in many cases, the correction also of the morbid state of the Meibomian glands and internal membrane of the eyelids. It is only when the treatment, conducted upon these mild principles, is found ineffectual, that the surgeon should think of examining the state of the nasal duct, and learning, by the introduction of a fine probe into the passage, whether any permanent stricture, or obstruction, is present. It does not appear to me, that it is a matter of much importance, whether the probe be made of whalebone, as Beer recommends, or of silver; but, that it should not be too thick is a thing certainly deserving greater attention. Supposing there is no direct opening through the skin into the lachrymal sac, one should be made with a lancet. However, a mere puncture will suffice, as a large incision, beginning just below the tendon of the orbicularis palpebrarum muscle, and extending in a semilunar form, nearly an inch downwards and outwards, as used to be the old practice, can here answer no rational object, the surgeon merely having occasion for a small direct opening, through which he may conveniently pass a small probe, for the purpose of ascertaining the state of the nasal duct. "The probe, (as Mr. M'Kenzie observes,) is to be introduced horizontally till it touches the nasal side of the sac; it should then be raised into a vertical position, and its point directed downwards and a little backwards. Turning the probe upon its axis, we pass it from the sac into the duct; and as we continue to press it gently downwards, the instrument, if the sac is pervious enters the nose. If its point meets with some obstruction, we must not immediately conclude, that there is an obliteration of the duct. We must press down the probe a little more strongly, yet without violence, turning it round between the fingers, and giving it different directions. By these means, the obstacle is frequently overcome, and the probe suddenly descends. If the obstacle remains as before, and is extremely firm, still this is not sufficient ground for us to conclude, that there is a real obliteration," because, as the author proceeds to point out, the difficulty may arise from a mere thickening of the mucous membrane and swelling and induration of its cryptæ. (*M'Kenzie on the Lachrymal Organs, p.* 78.)

When the probe has entered a good way down the nasal duct, and becomes, as it were, wedged, Beer leaves the instrument in this position, until the next time of dressing, taking care, however, to fix it to the forehead, so that it may not slip out again. At the same time, he introduces into the lachrymal sac a tent, which he keeps in with a piece of sticking plaster. (*Lehre von den Augenkr. B.* 2, *p.* 168;) a measure which I conceive may be advantageously dispensed with. When, at length, the probe can be made to pass with some trouble into the nostril, Beer recommends introducing the instrument regularly every day, until the increased diameter of the passage allows it to be put in and withdrawn without the slightest difficulty. The period is now arrived, when Beer conceives, that some measure should be taken for rendering the perviousness of the nasal duct complete and permanent, and thus entirely re-establishing the efficiency of the excreting parts of the lachrymal organs. But, says this author, whoever merely aims at restoring the natural diameter of the nas duct by mechanical means, fulfils only one, and that not the most essential indication. And in order that the duct may retain its natural diameter, and the tears and mucus descend freely into the nose, it is necessary, that the morbid state of the mucous membrane be first removed, and the action of the excreting parts of the lachrymal organs rectified again; objects which cannot be performed by any mechanical means. Hence, Beer places considerable stress upon the necessity of obviating every unfavourable state of the health, likely to affect the mucous membrane of the lachrymal sac. For the purpose of restoring the natural diameter of the nasal duct, the experience of many years has convinced him, that pieces of violin catgut, which are to be gradually increased in size, are the best. The end of the piece, which is to be introduced, is to be first softened a little between the teeth, straightened, and dipped in sweet oil. Then at least six inches of it are to be introduced, so that its lower end may be easily drawn out of the nostril; a business, which Beer always lets the patient do himself. The upper portion of the catgut is coiled up, and kept within a little linen compress, on the patient's forehead. Beer also places in the opening of the sac a small dossil of lint, and covers it with a bit of sticking plaster. In two hours, the patient is to try to force the lower end of the catgut out of the nostril, by driving the air through the opening, while the mouth and opposite nostril are shut. As soon as the end of the catgut is secured, it is to be turned over the side of the nose, and fixed there with a piece of sticking plaster. The next day, the bit of plaster over the sac is to be loosened with warm water, and together with the dossil of lint, taken away, and one of the lotions, hereafter specified, injected down the passage. The upper end of the catgut on the forehead is next to be unfastened, and a fresh portion of it covered with some of the applications, presently mentioned, when the patient is to draw it into the sac and duct, by gently pulling the end, which hangs out of the nostril. The superfluous lower piece of catgut is now cut away, and the new piece turned up, and fixed to the side of the nose. The injection is again repeated, and the dressings applied, as before. The same method is to be continued, until the whole of the first piece of catgut is expended. Some water, coloured with the vinous tincture of opium, is now to be thrown down the sac, in order to see, whether any part of the fluid will pass into the nose, and what progress has been made. Then a larger piece of catgut is to be employed, exactly in the manner of the first, and when it is all exhausted, the coloured injection is to be used again, in order to learn what advance has been made in the re-establishment of the natural diameter of the passage. Lastly, a catgut of still larger size is to be used, after which the coloured injection will be found, when the patient inclines his head forwards, to run freely out of the nostril, and not merely drop into it, as it did previously. When this is the state of things, all further dilatation becomes unnecessary. (*Beer, Lehre von den Augenkr. B.* 2, *p.* 169—172.)

This author then repeats his decided opinion, that the mechanical treatment with catgut, bougies, cannulæ, &c., will only answer, when attention is paid to rectifying the morbid state of the mucous membrane of the lachrymal sac by means of suitable applications, the use of which, he thinks, ought to commence with the first employment of the catgut. And, he adds, that even such treatment will only succeed, when the diseased state of the membrane of the sac is entirely a local complaint, and uncomplicated with any unfavourable condition of the health. In the beginning, if the probe can be introduced without any great trouble, and the lining of the duct is only trivially thickened, Beer moistens the catgut, on its daily introduction into the passage, with the vinous tincture of opium, and injects into the sac a lukewarm lotion, containing the proportions of subacetate of copper, nitrate of potass, alum, camphor, and vinum opii, specified in one of the preceding columns. The lint, which Beer places in the orifice of the sac, is also dipped in the vinum opii. When the probe meets with more resistance, the catgut is smeared with the unguentum hydrargyri nitrati, which is to be at first weakened, and afterward gradually increased in strength. The wound is also to be dressed with the same application, and some of the following lotion injected down the sac twice a day; ℞. Aq Ros. ℥iv. Hydrarg. Oxymur. grj. ss. gr. j. Mucil pur. ʒj. Vini opii ℈j. M. When any irregularities and indurated points are felt with the probe in the course of the nasal duct, Beer smears the catgut with an ointment, containing a small quantity of red precipitate, and directs frictions with a little camphorated mercurial ointment to be employed every day round the external opening.

Beer joins the generality of writers in believing that a long perseverance in the mechanical means is necessary, in order to remove all disposition in the nasal duct to close again. (*P.* 176.) And, as the use of the probes, syringe, catgut, and dossils of lint, may be supposed to have done more or less injury to the lachrymal ducts, so as to cause some impediment to the due conveyance of the tears into the lachrymal sac, Beer advises a trial to be made, whether a couple of drops of some coloured fluid, introduced into the inner canthus, while the patient is lying upon his back, will pass into the lachrymal sac; and, if they will not do so, the same author thinks, that an attempt should be immediately made to clear the lachrymal ducts, by means of Anel's probe. (*P.* 177.)

According to Beer, the foregoing treatment is perfectly useless, whenever the lachrymal puncta and ducts are obliterated; because, even if it were practicable to restore their perviousness, it would yet be impossible to communicate to the new-formed apertures and canals the power of absorbing the tears and conveying them into the lachrymal sac. He thinks, that, in this state of things, the practitioner need not trouble himself about the condition of the nasal duct; because, even if it were rendered duly pervious, this improvement would not continue long, as Beer's experience has fully convinced him, that, when the mucous secretion of the lachrymal sac is not blended with the tears, a closure of the nasal duct sooner or later ensues, and of course an accumulation of the mucus of the sac, a disease sometimes termed, under such circumstances, *hydrops sacculi lachrymalis.* And in order to prevent this complaint in the state of things just now described, Beer is an advocate for the total obliteration of the cavity of the sac with escharotics. (*B.* 2, *p.* 181.)

Such is the practice of Beer, with the view of clearing away obstruction in the nasal duct, and restoring its natural diameter. Let us now consider what methods have been suggested by others. Beginning then with the screw, invented by Fabricius ab Aquapendente, for compressing the distended lachrymal sac, I need only remark with M. Nicod, that, as this plan was not directed against the cause of the disease, it is not surprising, that it should have been unavailing, and ultimately banished from practice. In the year 1716, Anel invented a probe of so small a size, that it was capable of passing from the upper punctum lachrymale into the lachrymal sac, and nasal duct, the obstructions in which latter passage it was intended to remove. Anel also invented a syringe, whose pipe was small enough to enter one of the puncta, and by that means to furnish an opportunity of injecting a liquor into the sac and duct; and with these two instruments he pretended to be able to cure the disease whenever it consisted in obstruction merely, and the discharge was not much discoloured. "The first of these, viz. the passage of a small probe through the puncta, (says Mr. Pott) has a plausible appearance, but will, upon trial, be found very unequal to the task assigned; the very small size of it, its necessary flexibility, and the very little resistance it is capable of making, are manifest deficiencies in the instrument; the quick sensation in the lining of the sac and duct, and its diseased state, are great objections on the side of the parts, supposing that it was capable of answering any valuable end, which it most certainly is not." (*Pott.*)

It must be at once obvious, that Anel's instruments were devised with the view of avoiding a puncture in the lachrymal sac; but the principle has been strongly objected to by Beer, there being no comparison between the inconveniences of a small opening made in the sac, and the injury done to the lachrymal puncta and canals by the long and repeated introduction of instruments through them, whereby their functions are likely to be for ever ruined, of which Beer has seen some sad examples. (*Lehre, &c. B.* 2, *p.* 169.)

The next practice deserving notice, is that of Laforest, who used to introduce into the termination of the nasal duct in the nostril a probe, with which he cleared away the obstruction in the passage. He also introduced into the same orifice a curved tube, which was left in the part three or four months, for the purpose of employing injections. The method, however, was found not only troublesome and difficult, on account of the anatomical varieties to which the termination of the nasal canal was liable, but also on account of the treatment, when practised, being subject to frequent failures.

Following up the principles of Anel, another French surgeon, Méjean, dilated the nasal duct with a seton, which was drawn up into the lachrymal sac by means of a thread first introduced from the upper punctum lachrymale. But it was soon discovered, that what was gained on one side, was lost on the other; the lodgment of the thread in the lachrymal duct for several months, and the irritation of its orifice in changing the seton every day, not only causing inflammation of the punctum lachrymale, but even such ulceration and cicatrices, as sometimes destroyed the functions of the parts.

J. L. Petit, sensible of the inconveniences of Méjean's practice, and disgusted with the barbarous imitation of the ancients in cauterizing the fistula, sac, and os unguis, conceived that, instead of these plans, or that of perforating the os unguis, as proposed by Woolhouse, it would be better to endeavour to restore the natural passage, by removing the obstruction in the nasal duct, which obstruction Petit regarded as the cause of the disease. His method consisted in opening the lachrymal sac with a small bistoury, introducing through the wound, sac, and nasal duct a probe, down into the nostril, and then using bougies for the dilatation of the passage. This method may be said to be the model of that which has been most extensively followed even down to the present time. Pellier and Wathen recommended introducing a metallic tube down the ductus nasalis, and leaving it for a time in that situation, with a view of preventing the duct from closing again; and the use of a cannula is even now preferred by Dupuytren, the greatest surgeon of France.

The desire of avoiding any puncture of the sac has influenced many practitioners besides Anel, and given rise to various ingenious inventions. Thus, in 1780, Sir William Blizard proposed, instead of injecting water, to introduce quicksilver through a small pipe, communicating with a long tube full of this fluid. The specific gravity of the quicksilver, when the sac was distended with it, he believed would have more power than water propelled through a syringe, to remove the lachrymal obstruction.

The late Mr. Ware, after trying Sir William Blizard's plan, gave the preference to Anel's syringe, with which he generally injected warm water, through the lower punctum lachrymale, into the lachrymal sac, and put a finger over the superior punctum to prevent the fluid from escaping through it. With his finger he also occasionally compressed the lachrymal sac, in order to assist in propelling the water down into the nose. Mr. Ware sometimes used the injection thrice a day, though, in general, much less frequently. (See *Ware on the Epifora.*)

"I in general begin the treatment by injecting some warm water through the inferior punctum lachrymale, and I repeat the operation four or five days in succession. If in this space of time, none of the water pass through the duct into the nose, and if the watering of the eye continue as troublesome as it was before the injection was employed, I usually open the angular vein, or direct a leech to be applied near the lachrymal sac; adding here a caution, that the leech be not suffered to fix on either of the eyelids, lest it produce an extravasation of blood in the adjacent cells. About the same time that blood is taken away in the neighbourhood of the eye, I usually vary the injection, and try the effects either of a weak vitriolic, or anodyne lotion. In some instances also, when I have found it impossible, after several attempts, to inject any part of the liquid through the duct, I have introduced a golden probe, about the size of a bristle, through the superior punctum lachrymale, and, attending to the direction of the duct, have insinuated its extremity through the obstruction, and conveyed it fully into the nose; immediately after which I have found that a liquid, injected through the inferior punctum, has passed without any difficulty; and by repeating these operations for a few successive days, I have at length established the freedom of the passage, and completed the cure. In other instances, I have recommenced a strongly stimulating sternutatory to be snuffed up the nose, about an hour before the time of the patient's going to rest, which, by exciting a large discharge from the schneiderian membrane, has sometimes also greatly contributed to open the obstruction in the nasal duct.

"Cases occur very rarely which may not be relieved by some of the means above related." (*Ware's Additional Remarks on the Epiphora.*)

When the discharge was fetid, Mr. Ware sometimes found, that a vitriolic lotion injected into the sac, quickly corrected the quality of the matter.

In a subsequent tract, Mr. Ware observes, that if, after "about a week or ten days, there be not some perceptible advance towards a cure, or, if, from the long continuance of the obstruction, there be reason to fear, that it is too firmly fixed to yield to this easy mode of treatment, I do not hesitate to propose the operation which is now to be described. The only persons, with respect to whom I entertain any doubts as to the propriety of this opinion, are infants. In such subjects, I always think it adviseable to postpone the operation, unless the symptoms be particularly urgent, until they are eight or nine years old.

"If the disease has not occasioned an aperture in the lachrymal sac, or if this aperture be not situated in a right line with the longitudinal direction of the nasal duct, a puncture should be made into the sac, at a small distance from the internal juncture of the palpebræ, and nearly in a line drawn horizontally from this juncture toward the nose, with a very narrow spear-pointed lancet. The blunt end of a silver probe, of a size rather smaller than the probes, that are commonly used by surgeons, should then be introduced through the wound, and gently, but steadily, be pushed on in the direction of the nasal duct, with a force sufficient to overcome the obstruction in this canal; and until there is reason to believe, that it has freely entered into the cavity of the nose. The position of the probe, when thus introduced, will be nearly perpendicular; its side will touch the upper edge of the orbit; and the space between its bulbous end in the nose and the wound in the skin will usually be found, in a full-grown person, to be about an inch and a quarter, or an inch and three-eighths. The probe is then to be withdrawn, and a silver style of a size nearly similar to that of the probe, but rather smaller, about an inch and three-eighths in length, with a flat head like that of a nail, but placed obliquely, that it may sit close on the skin, is to be introduced through the duct, in place of the probe, and to be left constantly in it. For the first day or two after the style has been introduced, it is sometimes adviseable to wash the eye with a weak saturnine lotion, in order to obviate any tendency to inflammation which may have been excited by the operation; but this in general is so slight, that I have rarely had occasion to use any application to remove it. The style should be withdrawn once every day for about a week, and afterward every second or third day. Some warm water should each time be injected through the duct into the nose, and the instrument be afterward replaced in the same manner as before. I formerly used to cover the head of the style with a piece of dyachylon plaster spread on black silk; but have of late obviated the necessity for applying any plaster by blackening the head of the style with sealing wax."

Mr. Ware did not, on first trying this method, expect any relief, till the style was left off. However, he found, that the watering of the eye ceased, as soon as the style was introduced, and the sight became proportionably more useful and strong.

The wound, which Mr. Ware makes in the sac, when there is no suitable ulcerated aperture, is only just large enough to admit the end of the probe, or style; and this soon becomes a fistulous orifice, through which the style may be passed without the least pain. In short, in about a week or ten days, the treatment becomes so easy, that the patient, or any friend, is fully competent to do what is necessary. It merely consists in withdrawing the style, two, or three times a week, occasionally injecting some warm water, and then replacing the instrument as before.

Some, finding no inconvenience from the style, and being afraid to leave it off, wear it for years; many others disuse it in about a month, or six weeks, and continue quite well. The ulcerations, sometimes existing over the lachrymal sac, commonly heal, as soon as the tears can pass down into the nose; but Mr. Ware mentions two instances, in which such sores did not heal until a weak solution of the hydrargyrus muriatus, and bark. were administered. (See *Ware on the Fistula Lachrymalis.*)

Great as the recommendation of the foregoing practice is, as delivered by Mr. Ware, Mr. Travers is strongly disposed to doubt, whether any permanent benefit was ever derived from letting the style remain in the passage. When an abscess over the sac has been opened, this gentleman, instead of the introduction of a style into the ductus nasalis, recommends simply the examination of the duct with a fine probe. "If the probe passes without resistance into the nose, the case requires no further operative treatment, the integument recovers its healthy condition under an emollient application, the discharge gradually diminishes, and the wound heals. If, on the other hand. upon examination with the probe, introduced through the wound, into the sac, resistance is offered to its passage into the nose, no more favourable opportunity will be presented for overcoming such resistance. This, therefore, should be accomplished, but to this the operative process should be limited, and the wound should be suffered to heal without further disturbance." When there is what Mr. Travers terms a stricture in the nasal duct, and the passage of the probe is more firmly resisted. he admits that some means must be employed for keeping the duct pervious, after it has been reopened. He never interferes with the integuments, except in the case of abscess discolouring the skin, and threatening to produce a fistula; and for the purpose of restoring the passage, he uses a set of silver probes, of about five inches long, of various sizes, flattened at one end, and slightly bulbous at the point. When there is no obstruction, these, he says, may be introduced with perfect facility from either of the puncta lachrymalia into the nostril. "If the punctum be constricted, it is readily entered, and dilated by a common pin; and, upon withdrawing it, by one of the smaller probes. The direction and relative situation of the lachrymal ducts, the sac, and nasal canal, point out the proper course of the instrument. It is confirmed by its advance, without the employment of force, and the sensation conveyed by the free and unincumbered motion of its point. Until the point is fairly within the sac, it is necessary to keep the eyelid gently stretched and slightly everted; the upper lid being drawn a little upward toward the brow; the lower, as much downward toward the zygoma. The point carried home to the sac, and touching lightly its nasal side, the lids may be left at liberty, while a half circular motion is performed by the instrument; the surgeon neither suffering the point to recede, nor, on the other hand, allowing it to become entangled in the membrane. The probe now rests, in a perpendicular direction, upon the eyebrow, toward its inner angle, and, in this direction, it is to be gently depressed, until it strikes upon the floor of the nostril, where its presence is readily ascertained by a common probe passed beneath the inferior turbinated bone. The probe, of smallest dimensions, is of sufficient firmness to preserve its figure in its passage through the healthly duct, but it is too flexible to oppose any considerable obstruction. For the stricture of the lachrymal ducts, it is of sufficient strength. Very many cases of recent origin, and in which the stricture has no great degree of firmness, (Mr. Travers says) are completely cured by three or four introductions of the probe into the nostril, at intervals of one, or two days. I have seldom met with a stricture so firm as not to yield to the full-sized probe." When the resistance is not altogether removed, after this plan has been tried some days, Mr. Travers introduces a style, having a small flat head, a little sloped, through the punctum lachrymale into the nose, and leave it in the nasal duct for twenty-four hours. If worn longer, he says, that it causes ulceration of the orifice. A day or two is to elapse, before the style is again introduced, which must now be passed through the other lachrymal duct. On the intervening days, tepid water should be injected with Anel's syringe. (*Synopsis of the Diseases of the Eye*, p. 369, 370, 372, 374.)

Thus, we see, that Mr. Travers's practice bears a considerable resemblance to that of Anel, inasmuch as the sac is never opened, except when likely to ulcerate, and nearly every thing is done with probes and injections, introduced through the lachrymal puncta and ducts. I wish that my views of the nature of these diseases, and of the parts concerned, would allow me to think the latter proceedings, in the case of stricture of the nasal duct, as commendable as another part of Mr. Travers's practice, where, in cases of slighter obstruction, he contents himself with opening the sac, clearing away the stoppage of the nasal duct with a probe, and healing up the wound, without leaving any style, cannula, or seton in the passage. Where the obstruction is very slight, such practice must be judicious. But if, in other cases, it be deemed right for the prevention of a relapse, that the nasal duct should be either filled with some dilating instrument a certain time, or repeatedly probed, I am decidedly of opinion with Professor Beer, M. Nicod, &c. that the object of not making a small opening in the sac is attended with no advantage, at all likely to counterbalance the mischief, which must be done to the lachrymal puncta and ducts, not only by the repeated introduction of probes and of syringes, but by the lodgment of the former in them for the space of twenty-four hours together. If there be an opening in the sac, its convenience in permitting the easy use of a probe is generally acknowledged; and, in order to gain this advantage, and avoid the evils, which are inseparable from taking too much liberty with the lachrymal puncta and ducts, surely a slight puncture in the sac, if there be no opening already, must be the most rational, simple, and successful practice.

When the perviousness of the nasal duct cannot be restored by any use of the probe, and the obstructed part has a very elastic feel, is of inconsiderable extent, and near the termination of the duct in the nostril, Beer recommends a perforation to be made with a trocar-shaped probe, the point of which is to be covered with a bit of wax, in order that it may not hurt the parts in its passage downward. Some discharge of blood from the nose indicates, that the perforation is made. The sharp-pointed probe is then to be withdrawn, a blunt one used for the purpose of dilating the passage, and, at length, the catgut, as already explained. (*Beer*, *B.* 2, *p.* 181.)

Supposing the nasal duct to be obliterated for a considerable part of its extent, by a firmer substance, what practice should then be followed? Ought the formation of an artificial passage to be attempted? On this point, modern practitioners differ, but, as the expedients adopted for this purpose cannot be judged of previously to their description, it will be better in the first place briefly to notice them. As Mr. Pott has remarked, the upper and hinder part of the lachrymal sac is firmly attached to the os unguis, a small, and very thin bone, just within the orbit, which bone is so situated, that, if it be by any means broken through, the two cavities of the nose and orbit communicate with each other: consequently, the os unguis forms the partition between the hinder part of the lachrymal sac, and the upper part of the cavity of the nose; and it is by making a breach in this partition, that the formation of an artificial passage has been attempted. In Mr. Pott's time, the cautery had long been disused for making an aperture in the os unguis, and various instruments were recommended for this object, such as a large strong probe, a kind of gimblet, a curved trocar, &c. each of which, says this practical writer, if dexterously and properly applied, will do the business very well; the one necessary caution is, so to apply whatever instrument is used, that it may pierce through that part of the bone which lies immediately behind the sacculus lachrymalis, and not to push too far up into the nose, for fear of injuring the os spongiosum behind, while it breaks its way. Mr. Pott adds, that he himself has always used a curved trocar, the point of which should be turned obliquely downward, from the angle of the eye, toward the inside of the nose. The accomplishment of the breach will be known by the discharge of blood from the nostril, and of air from the wound, upon blowing the nose. Care must be taken to apply the instrument to the part of the bone, anterior to the perpendicular ridge, which divides it.

As soon as the perforation is made, a tent of lint should be introduced, of such size as to fill the aperture, and so long as to pass through it into the cavity of the nose: this should be permitted to remain in two, three, or four days, and afterward a fresh one should be passed every day, until the clean granulating appearance of the sore makes it probable, that the edges of the divided membrane are in the same state. The business now is to prevent the incarnation from closing the orifice; for which purpose, the end of the tent may be moistened with diluted vitriolic acid, or a piece of lunar caustic, so included in a quill, as to leave little more than the extremity naked, may at each dressing, or every other, or every third day, be introduced; by which the granulations will be repressed, and the opening maintained; and when this has been done for some little time, a piece of bougie of proper size, or a leaden cannula, may be introduced instead of the tent; and leaving off all other dressings, the sore may be suffered to contract as much as the bougie will permit; which should be of such length, that one extremity of it may lie level with the skin in the corner of the eye, and the other be within the nose.

The longer time the patient can be prevailed upon to wear the bougie, the more likely will be the continuance of the opening; and when it is withdrawn, the external orifice should be covered only by a superficial pledget, or plaster, and suffered to heal under moderate pressure. (*Pott.*)

After the perforating instrument was withdrawn, Mr. Ware recommended a nail-headed style, about an inch long, to be introduced through the aperture, in the same way in which it is introduced through the nasal duct, in cases in which the obstruction is not so great as to prevent its passing in this direction; and it may remain here with as much safety as in this last-mentioned instance, for as long a time as its continuance may be thought necessary to establish the freedom of the communication.

Unfortunately for the scheme of making an artificial passage, nature was generally so busy, that she completely frustrated the aim of the surgeon by gradually filling up the new aperture again. Hence, some practitioners were not content with drilling a hole through the os unguis, but actually removed a portion of this bone either with the forceps proposed by Lamorier in 1729. (See *Mém. de l'Acad. des Sciences*,) or with cutting instruments, among which the most celebrated is the sharp-edged kind of cannula devised by Hunter. While this was being applied, however, it was necessary to support the os unguis with something passed up the nose, and a piece of horn was found to answer very well. Instead of these methods, Scarpa prefers destroying a portion of the os unguis with the actual cautery passed through a cannula; a practice, long ago banished from good surgery, and most justly condemned by Richter.

I do not feel it necessary to enter very particularly into the details of these methods of forming an artificial passage between the lachrymal sac and nostril. I have never seen a case, in which I should have deemed such practice adviseable, and that the necessity for it must be rare must be inferred from what Mr. Travers has observed, viz. that he does not believe the perforation of the os unguis ever really required it. (*Synopsis, p.* 379.) Beer's remarks are also decidedly against the practice; for, he states that, in order that the new opening may not be closed with lymph, it must be made too high up to serve the purpose of a drain, through which the mucus can descend by its own gravity. He has not met with a single case, either in his own practice, or among the patients whom he has had opportunities of seeing under other practitioners, where the perforation of the os unguis had a successful result. On the contrary, in one healthy lad, the operation, which had been done by an experienced surgeon, was followed by the destruction of the nasal process of the upper maxillary bone, one of the ossa nasi, and all the bones contributing to the formation of the passage from the orbit into the nose. (See *Lehre von den Augenkr. B.* 2, *p.* 182.) Hence, Beer thinks, that the patient had better either submit to the inconvenience of being obliged to empty the distended sac by pressure several times a day, or let the cavity of the sac be obliterated by means, calculated to excite the adhesive inflammation in it. But, if the lachrymal puncta and ducts, as well as the nasal duct, are obliterated, Beer conceives that there is no alternative, because, if the cavity of the sac be left, the case, which he terms hydrops sacculi lachrymalis, will ensue, whenever the fistula is closed.

Of Hernia and Hydrops of the Lachrymal Sac.—The diseases, described by Beer under these appellations, are not discriminated in this country, although they are characterized by widely different symptoms, and require opposite methods of treatment. In the case of hernia, or simple relaxation, the lachrymal sac forms a tumour, which never surpasses the size of a common horse-bean, the integuments are of their natural colour, the tumour is soft and yielding to pressure, by which the contents of the sac are readily discharged through the puncta, or nasal duct. Hydrops grows to the size of a pigeon's egg, is purplish from the beginning, very hard and incapable of being emptied by the strongest pressure. Hernia is cured by compression, and the application of astringents to the relaxed parts; hydrops requires the incision of the sac. In hernia, the nasal duct is natural; in hydrops, it and sometimes the puncta are obstructed.

Stillicidium Lachrymarum.—According to Beer, the valuable treatise of Schmidt is the only work, in which the important practical distinction is drawn between stillicidium lachrymarum and epiphora; the immediate cause of the first complaint being some impediment to the passage of the tears from the lacus lachrymarum into the lachrymal sac; while the other affection consists in a redundant and extraordinary secretion of the tears. The curable form of stillicidium, here to be noticed, arises from relaxation of the lachrymal puncta and canals, in consequence of previous inflammation of the parts. The puncta are widely open; but in other respects, have quite a natural appearance. When touched with Anel's probe, they do not contract, as in the healthy state. The tears, which from time to time fall over the cheek, are not in considerable quantity, only trickling from the inner canthus by drops at intervals; and the nostril on the affected side is found to be rather drier than natural.

Erysipelatous inflammation of the eyelids and parts over the lachrymal sac, and the purulent kinds of ophthalmy, frequently cause this sort of stillicidium. The latter cases indeed the more readily produce the disorder, inasmuch as the semilunar fold of the conjunctiva is relaxed and swelled, so as to push the puncta out of their right position for the due performance of the absorption of the tears, and obstruct this function more than would be the case, if the diminished action of those orifices and the lachrymal ducts were the only thing concerned.

Beer delivers an exceedingly favourable prognosis, observing, that the complaint often disappears of itself on the approach of warm dry weather, and may almost always be readily cured, by means of astringents. Among other remedies specified by this author, I need only mention a solution of the sulphate of iron, to which a small quantity of camphorated spirit, or tincture of opium, has been added. It is to be dropped out of a pen into the inner angle frequently in the course of the day, the patient lying upon his back for some time after each application, so as to let the medicine have more effect upon the parts. (See *Lehre von den Augenkr. B.* 2, *p.* 41—43.)

Mr. Travers mentions a constricted state of the lachrymal puncta and canals, which is curable by the introduction of a small probe. (*Synopsis, &c. p.* 366.) All modern writers agree, that the obliterated puncta and canals can never be restored. (See *Mémoires de l'Academie de Chirurgie, T.* 5, *Edit.* 12*mo. in which are several essays on fistula lachrymalis viz. one by M. Bordenave, entitled, "Examen des Réflexions critiques de M. Molinelli, insérées dans les Mémoires de l'Institut de Bologne, contre le Mémoire de M. Petit, sur la Fistule Lachrymale, inséré parmi ceux de l'Acad. Royale des Sciences de Paris. Année* 1734. *Another essay by M. de la Forest, styled "Nouvelle Methode de traiter les Maladies du Sac Lachrymal, nommées communément Fistules Lachrymales." A third by M. Louis, called "Réflexions sur l'Operation de la fistule Lachrymale." G. E. Stahl, Programma de Fistula*

Lachrymali, Halæ, 1702. *J. C. Scholunger, De Fistula Lachrymali, Basil,* 1730. *J. D. Metzger, Curationum Chir. quæ ad Fistulam Lachrymalem sive usque fuere adhibitæ, Historia Critica,* 8vo. *Monasterii,* 1772. *P. A. Lepy, Quæstio, &c. An fistulæ lachrymali cauterium actuale? Paris,* 1738. *J. L. Petit, Traité des Mal. Chir. T.* 1, *p.* 289, *&c.* 8vo. *Paris,* 1774. *M. A. Magnabal, De Morbis Viarum Lachrymalium, ac præcipue de fistula lachrymali, Montp.* 1765. *A. Bertrandi, Traité des Opérations, p.* 297, 8vo. *Paris,* 1784. *Anel has described his plan of treatment in various works: "Observation singulière sur la fistule lacrymale, dans laquelle l'on apprendra la méthode de la guérir radicalement." Turin,* 1713, *in* 4to. *"Nouvelle Méthode de guérir les fistules lacrymales." Turin,* 1713, *in* 4to. *"Suite de la Nouvelle Méthode," &c. ibid.* 1714, *in* 4to. *"Dissertation sur la nouvelle découverte de l'hydropisie du conduit lacrymal," Paris,* 1716, *in* 12mo. *And, lastly, Anel has published in the Mém. de l'Acad. des Sciences, année* 1713, *"Précis de sa nouvelle manière de guérir les fistules lacrymales." Méjean in Mém. de l'Acad. de Chir. T.* 2, *p.* 193, 4to. *Palucci, Methodus curandæ fistulæ lachrymalis, Vindob.* 1762; *a tube preferred. Sabatier, Médecine Opératoire, T.* 2, *Ed.* 2. *Richter's Anfangsgründe der Wundarzneykunst, B.* 2. *Kap.* 11. *Pott's observations relative to the disorder of the corner of the eye, commonly called the Fistula Lachrymalis,* 8vo. *Lond.* 1758. *Sir W. Blizard, A New Method of treating the Fistula Lachrymalis,* 4to. *Lond.* 1780. *Ware on the Epiphora and Fistula Lachrymalis;* 8vo. *Lond.* 1792—95. *Scarpa sulle principali Malattie degli Occhi, Capo* 1. *Wathen's New and easy Method of applying a Tube for the Fistula Lachrymalis, Lond.* 1781, *and* 2d *Ed.* 1792. *Sprengel, Geschichte der Wichtigsten Chir. Operationen, p.* 105. *Nicod, Mémoire sur la Fistule Lacrymale in Revue Méd. Historique, &c. livr.* 1 *et* 2, 8vo. *Paris,* 1820. *Fournier, Diss. de l'Appareil des voies lachrymales; Montpellier,* 1803. *J. L. Angely, Commentatio Medica de Oculo Organisque Lachrymalibus ratione Ætatis, Sexus, Gentis, et Variorum Animalium.* 8vo. *Erlangæ,* 1803. *Reil, Diss. de Chir. Fistulæ Lachrymalis Curatione, Berol.* 1812; *Flajani, Collezione d'Osservazioni, T.* 3. *Desault, Œuvres Chir. T.* 2, *p.* 119, 8vo. *Paris,* 1801. *J. C. Rosenmüller, Partium Externarum Oculi Humani, imprimis Organorum lachrymalium, Descriptio Anatomica; iconibus illustrata,* 4to. *Lips.* 1810. *C. H. T. Schreger, Versuch einer Vergleichenden Anatomie des Auges und der Thränenorgane des Mensehen und der übrigen Thierklassen,* 8vo. *Leipz.* 1810. *Beer, Lehre von den Augenkrankheiten,* 2 *B.* 8vo. *Wien,* 1813—1817. *Wm. Mackenzie, An Essay on the Diseases of the Exereting Parts of the Lachrymal Organs,* 8vo. *Lond.* 1819; *contains many valuable observations from the writings of Beer. B. Travers, A Synopsis of the Diseases of the Eye, p.* 228—359, *&c.* 8vo. *Lond.* 1820. *Ph. v. Walther ueber die steinigen Concretionen der Thränenflussigkeit, in Journ. für Chirurgie von C. Graefe, B.* 1, *p.* 163, 8vo. *Berlin,* 1820. *J. A. Schmidt über die Krankheiten des Thränenorgans; a work of the highest reputation.*

LAGOPHTHALMIA, or LAGOPHTHALMOS. (from λαγος, a hare; and οφθαλμος, an eye.) *The Hare's Eye. Oculus Leporinus.* A disease, in which the eye cannot be completely shut. The following complaints may arise from it; a constant weeping of the organ, in consequence of the interruption of the alternate closure and opening of the eyelids, which motions so materially contribute to the propulsion of the tears into the nose; blindness in a strong light, in consequence of the inability to moderate the rays, which enter the eye; on the same account, the sight becomes gradually very much weakened; incapacity to sleep where there is any light; irritation, pain, and redness of the eye, from this organ being exposed to the extraneous substances in the atmosphere.

An enlargement, or protrusion of the whole eye, or a staphyloma, may obviously produce lagophthalmos. But, affections of the upper eyelids are the common causes. Heister has seen the complaint originate from a disease of the lower one. Now and then lagophthalmos depends on paralysis of the orbicularis muscle. A cicatrix, after a wound, ulcer, or burn, is the most frequent cause.

When lagophthalmos arises from a paralytic affection of the orbicularis palpebrarum, the eyelids may be rubbed with a liniment containing the tinctura lyttæ, or the linimentum camphoræ. Electricity and cold bathing are also considered principal means of cure, (*Chandler*) together with the exhibition of bark, the use of the shower-bath, &c.

When the affection arises from spasm of the levator palpebræ superioris, electricity, a small blister on the neighbouring temple, and rubbing the eyelid and eyebrow with the tinctura opii, are recommended, together with antispasmodic medicines.

When lagophthalmos arises from the contraction of a cicatrix, its relief is to be attempted precisely on the same principles as the ectropium. (See *Ectropium.*) However, when the eyelid is shortened as well as everted, nothing will remove the deformity

The inconveniences, depending on the eye being unable to shelter itself from the light, are to be obviated by wearing a green shade.

Whoever is acquainted with German, and is desirous of more minute information on this subject, may find an excellent account of lagophthalmos in *Richter's Anfangsgr. der Wundarzn. B.* 2. *Von dem Hasenauge.* See also *Beer's Lehre von den Angenkr. B.* 2, *p.* 239, *&c.* 8vo. *Wien,* 1817.

LARYNGOTOMY. (from λαρυγξ, the larynx; and τεμνω, to cut.) The operation of making an opening into the larynx. (See *Bronchotomy.*)

LATERAL OPERATION. One mode of cutting for the stone. (See *Lithotomy*

LENTICULAR. (from *lenticulaire,* doubly convex.) An instrument, contained in every trephining case, and employed for removing the irregularities of bone from the edge of the perforation, made in the cranium with the trephine. One side of its blade is convex, the other concave; and one of its edges is sharp. On the end of the blade is fixed a little shallow cup, with its concavity towards the handle of the instrument. This part serves the purposes of receiving the little pieces of bone, when detached, keeping the end of the blade from hurting the dura mater, and, when applied under the margin of the opening, enables the operator to guide the edge of the instrument all round it, with steadiness and security.

LEUCOMA. (from λευκος, white.) Leucoma and albugo are often used synonymously, to denote a white opacity of the cornea. Both of them, as Scarpa remarks, are essentially different from the nebula of the cornea; for, they are not the consequence of chronic ophthalmy, with varicose veins, and an effusion of a milky serum into the texture of the delicate continuation of the conjunctiva over the cornea; but, are the result of violent acute ophthalmy. In this state, a dense coagulating lymph is extravasated from the arteries; sometimes superficially, at other times deeply into the substance of the cornea. On other occasions, the disease consists of a firm callous cicatrix on this membrane, the effect of an ulcer, or wound, with loss of substance. The term *albugo*, strictly belongs to the first form of the disease; *leucoma* to the last, more particularly when the opacity occupies the whole, or the chief part, of the cornea.

The recent albugo, remaining after the cure of severe acute ophthalmy, is of a clear milky colour; but, when of ancient date, it becomes pearl-coloured. Some cases, which have existed a considerable time, do not seem to have any connexion with the vascularity of the cornea; for they continue insulated in the middle of the transparent portion of this membrane, without occasioning the least uneasiness to the patient, the least disturbance of the rest of the eye, or any attempt of the absorbents to remove them.

The recent albugo, provided the organization of the cornea be not destroyed, may generally be dispersed by the means employed for the relief of the first and second stages of acute ophthalmy; viz. general and topical blood-letting with internal antiphlogistic medicines, and topical emollients for the first; slightly irritating and corroborant applications for the second. As soon as the inflammation has subsided, the latter should be employed; for, by making the absorbents remove the coagulating lymph, deposited in the cornea, they restore the transparency of this membrane.

But, though this may often be accomplished in the recent state of albugo, it is more difficult when the long duration of the disease has paralyzed the absorbents of the affected part; or when the deposition of a dense tenacious substance into the cornea has subverted its organization. (*Scarpa.*)

The recent condition of the disease, without disorganization of the structure of the cornea; its occurrence in young subjects, whose absorbents are readily excited by external stimulants; are circumstances favourable to the cure. In children, the albugo, arising from severe ophthalmy after the small-pox, and insulated in the centre of the cornea, very often disappears of itself in the course of a few months. Heister, Langguth, and Richter, make the same observation. The event can only be imputed to the vigorous action of the lymphatics in children, and to the organization of the cornea not being destroyed. For promoting the absorption, Scarpa recommends the following collyrium: ℞. Ammon. muriatæ. ℈ij. Cupri acetati gr. iv. Aquæ Calcis ℥viij. Misce. The fluid is to be filtered, after standing twenty-four hours. He praises also this ointment: ℞. Tutiæ præpar. ʒj. Aloes. s. p. gr. ij. Hydrargyri submur. gr. ij. Adipis suillæ. ℥ss. Misce. And the unguentum ophthalmicum of Janin. He mentions the gall of the ox, sheep, pike, and barbel, applied to the cornea, two or three times a day, with a small hair pencil, if too much irritation should not be produced. In some subjects, when the eyes are very irritable, and cannot bear the latter applications, Scarpa has found the oil of walnuts an useful application. But it is generally necessary to persevere, at least three or four months, before the case can be reckoned incurable.

All the expedients, proposed for the inveterate albugo or leucoma from a cicatrix, consisting of scraping or perforating the layers of the cornea, and exciting ulceration there, are unavailing. For, though the enlargement of the cornea should be lessened by such means, its diaphanous state could not be restored; or should the patient perceive a ray or two of light immediately after the operation, the benefit would only be transient; for, as soon as the wound had healed, the opacity would recur. The formation of an artificial ulcer might prove useful, if leucoma depended on a mere extravasation of lymph; but, the fact is, the disease arises from the deposition of an opaque substance, and the disorganization of the texture of the cornea, conjointly: in this lies the difference between albugo and leucoma.

See *Scarpa sulle Malattie degli Occhi; 8vo. Venezia*, 1802. *Richter, Anfangsgrunde der Wundarzn. B. 3. Essays on the Morbid Anatomy of the Eye, by J. Wardrop; Edinb.* 1808: *chap.* 11.

LIGATURE. In the article *Hemorrhage*, it has been explained, that the immediate effect of a tight ligature on an artery, is to cut through its middle and internal coats, a circumstance that tends very much to promote the adhesion of the opposite sides of the vessel to each other. Hence, I think with Dr. Jones, in opposition to Scarpa, that the form and mode of applying a ligature to an artery should be such, as are most certain of dividing the above coats of the vessel, in a regular manner. A broad flat ligature does not seem likely to answer this purpose well; because it is scarcely possible to tie it smoothly round the artery, which is apt to be thrown into folds, or to be puckered by it, and, consequently, to have an irregular bruised wound made in its middle and internal coats. (*Jones.*) A ligature of an irregular form is likely to cut through these coats more completely at some parts, than others; and if it does not perfectly divide them, though adhesion may yet take place, it is a slower and less certain event, and secondary hemorrhage more likely to follow. The fear of tying a ligature too tight may often lead to the same disadvantages. These, and many other important circumstances, are noticed in the article *Hemorrhage.*

Ligatures are commonly made of inkle, and rubbed with white wax. They should be round, and very firm, so as to allow being tied with some force, without risk of breaking. (See *Jones on Hemorrhage, p.* 172.)

The principles, which should guide the surgeon in the use of the ligature, were not known until the late Dr. Jones published his valuable treatise on hemorrhage. As an able surgeon has observed, "he has banished (at least in this country) the use of thick and broad threads, of tapes, of reserve ligatures, of cylinders of cork and wood, linen compresses, and all the contrivances, which, employed as a security against bleeding, only served to multiply the chances of its occurrence." (*Lawrence, in Med. Chir. Trans. Vol.* 6, *p.* 162.)

In the article *Amputation*, I have noticed the method of cutting off both ends of the ligature close to the knot, on the face of the stump, with the view of lessening the quantity of extraneous matter in the wound, and promoting a complete union of the divided parts, without suppuration.

This plan has been tried by Mr. Lawrence: "The method I have adopted (says this gentleman) consists in tying the vessels *with fine silk ligatures*, and cutting off the ends as close to the knot as is consistent with its security. Thus the foreign matter is reduced to the insignificant quantity, which forms the noose actually surrounding the vessel, and the knot, by which that noose is fastened. Of the silk, which I commonly employ, a portion sufficient to tie a large artery, when the ends are cut off, weighs between one-fiftieth and one-sixtieth of a grain: a similar portion of the thickest kind I have tried, weighs one-twentieth of a grain, and of the slenderest one-eightieth."

Mr. Lawrence states, that the kind of silk twist which is commonly known in the shops by the name of dentist's silk, and which is used in making fishing lines, is the strongest material, in proportion to its size, and therefore the best calculated for our purpose, which requires considerable force in drawing the thread tight enough to divide the fibrous and internal coats of the arteries. This twist is rendered very hard and stiff by means of gum, which may be removed by boiling it in soap and water; but the twist then loses a part of its strength. The stoutest twist which Mr. Lawrence has used, is a very small thread compared with ligatures made of inkle. The quantity of such a thread, necessary for the noose and knot on the iliac artery, weighs one-twentieth of a grain; or, if the gum has been removed, about one-twenty-sixth. But the finest twist, kept in the silk shops, is strong enough in its hard state for any surgical purpose; and the noose and knot, according to Mr. Lawrence's statement, would not weigh one-fortieth of a grain.

It further appears, from the report of this gentleman on the subject, that there is no danger of these ligatures cutting completely through the vessel, as some surgeons have apprehended; and that, although he has not yet ascertained what becomes of the piece of ligature after the wound is united, he has never seen abscess nor any other bad symptom occasioned by them. At the time when Mr. Lawrence wrote, he had employed this method of securing the arteries in ten or eleven amputations, in six operations on the breast, and in the removal of two testicles. The cases all did well, excepting a man who lost his thigh, and who died of an affection of the lungs. (See *Lawrence on a New Method of Tying the Arteries in Aneurism, &c. in Medico-Chir. Trans. Vol.* 6, *p.* 156, *&c.*)

The foregoing method was tried by myself in several amputations, which I performed in 1815 at Brussels, and in a larger number of cases by my friend, Mr. Collier. Our ligatures, however, though small, were not so small as those judiciously recommended by Mr. Lawrence; and, on this account, no accurate inferences can be drawn from our examples, which, however, as far as I could learn, were not unfavourable to the practice.

This subject was mentioned by Mr. Guthrie, as follows:—Some military surgeons, both French and English, have lately adopted the practice of cutting off both ends of the ligatures close to the knot on the artery, uniting the parts, if possible, over them, and allowing the knots to find their way out as they can. The edges of the wound, in some instances, have united thoroughly in a few days, and when the knots have come off the ends of the arteries, they have caused small abscesses to be formed, which point at the nearest external surface, and are discharged with little uneasiness. I know that many cases, treated in this manner, in the campaign of 1813, ended successfully, and healed in as short a time as the most favourable ones by the usual method; and at Montpellier, in June, 1814, Mons. Delpech, Professor of Surgery in that university, showed me at least twenty cases in which he had, and was still practising this method with success. I have seen, however, in two or three instances, some ill-looking abscesses formed by them, and I suspect some disagreeable consequences will ensue, if this practice be continued.

"I consider this improvement as very valuable in all cases, that will not unite by the first intention. The ligatures, if there be many, form into ropes, are the cause of much irritation, and are frequently pulled away with the dressings; by cutting them off, these evils are avoided, and the knots will come away with the discharge." (See *Guthrie on Gunshot Wounds of the Extremities, p.* 93. 94.)

With respect to the abscesses, which this gentleman saw produced by the method, it is properly observed by Mr. Lawrence, that as this statement is not accompanied by any description of the materials, or size of the ligature, nor by any details of the unfavourable cases, we cannot judge, whether the events alluded to are to be attributed to the method itself, or to the way in which it was executed. (See *Méd. Chir. Trans. Vol.* 6. *p.* 171.)

M. Roux has tried the plan in three operations on the breast; the cases did well; and no ill consequences arose from the presence of the bits of thread under the cicatrix. (See *Relation d'un Voyage fait à Londres en* 1814, *ou Parallele de la Chirurgie Angloise avec la Chirurgie Françoise; Paris,* 1815, *p.* 134—136.) For other remarks, connected with the foregoing topics, see *Amputation, Aneurism,* and *Hemorrhage.*

LINIMENTUM ACIDI SULPHURICI.—℞. Olei Olivæ ℥iss. Acid. Sulph. ℥ss. M. Recommended by Mr. Brodie, for the removal of the effects left by inflammation of the synovial membrane. (See *Joints.*)

LINIMENTUM AMMONIÆ FORTIUS.—℞. Liq. ammon. ℥j. Olei olivæ ℥ij. Misce. Properties stimulating.

LINIMENTUM CALCIS.—℞. Aquæ calcis, Olei olivæ, sing. ℥viij. Spirit. vinosi rectificati ℥i. Misce. A common application to burns and scalds.

LINIMENTUM CAMPHORÆ COMPOSITUM.—℞. Camph. ℥ij. Aq. ammon. ℥vj. Spirit. lavend. ℥xvj. Sixteen ounces are to be distilled of the two last ingredients, from a glass retort, and the camphor then dissolved in the distilled fluid. For bruises, sprains, rigidities of the joints, incipient chilblains, &c.

LINIMENTUM CAMPHORÆ ÆTHEREUM.—℞. Camphoræ drach. j. Ætheris unc. ss. Olei. viperarum drach. ij. Misce. The camphor is to be dissolved in the æther, and the oil afterward incorporated with it. The late Mr. Ware sometimes used this application, in certain obscure affections of the eye, in which it was not easy to determine, whether the imperfection of the sight proceeded from an incipient cataract, or a defect of sensibility in the optic nerve. The mode of applying it is to moisten the finger with it, and to rub it for two or three minutes together, morning and evening, on the outside and edges of the eyelids. (*Pharm. Chirurgica.*)

LINIMENTUM HYDRARGYRI COMPOSITUM.—℞. Ung. hydrargyri fortioris, Adipis suillæ, sing. ℥i. Camph. ʒj. Spirit. vinos. rectif. ʒj. Liq. ammon. ℥j. The camphor being dissolved in the spirit of wine, add the liq. ammon. and the ointment previously blended with the hog's lard. (*Pharm. Sancti. Barthol.*) An excellent formula for all surgical cases, in which the object is to quicken the action of the absorbents, and gently stimulate the surfaces of parts. It is a capital application for diminishing a chronic indurated state of particular muscles, every now and then met with in practice; and it is particularly well calculated for lessening the stiffness and chronic thickening often noticed in the joints.

LINIMENTUM POTASSÆ SULPHURETI.—℞. Saponis Albi. ℥iv. Olei Amygdalæ ℥viij. Potassæ Sulphureti ʒvj. Olei Thymi gr. xv. vel ℈j. This liniment, used twice a day, will cure the itch in five days, or, at latest, in eight. It has very little unpleasant smell, and would be preferable to sulphur ointment, if equally efficacious. (See *London Medical Repository, Vol.* 3, *p.* 242 *and Cross's Sketches of the Medical Schools of Paris, p.* 176.)

LINIMENTUM SAPONIS COMPOSITUM.—℞. Sapon. ℥iij. Camph. ℥j. Spirit. rorismar. ℔j. Dissolve the soap in the spirit, and then add the camphor. Uses the same as those of the linimentum camph.

LINIMENTUM SAPONIS CUM OPIO. ℞. Lin. sapon. comp. ℥vj. Tinct. opii. ℥ij. Misce. For dispersing indurations and swellings attended with pain, but no acute inflammation.

LINIMENTUM TEREBINTHINÆ.—℞. Ung. resinæ flavæ ℥iv. Ol terebinthinæ, q. s. Misce. The well-known application for burns, recommended by Kentish. (See *Burns.*)

LINIMENTUM TEREBINTHINÆ SULPHURICUM.—℞. Olei olivæ ℥x. Ol. terebinth. ʒiv. Acidi Sulph. ʒiij. Misce. Said to be efficacious in chronic affections of the joints, and in the removal of the old effects of sprains and bruises. (*Pharm. Chirurgica.*)

LIP, CANCER OF. The lips are subject to ulcers, which put on a very malignant aspect, although some of them are not in reality malignant; and many occurring just on the inside of these parts, will be found to depend on the bad state of the constitution, and the irritation and disturbance which the sores are continually suffering from the incessant motion of the parts, and their rubbing against a projecting, or rough tooth.

Arsenic is frequently useful in subduing the obstinacy and malignity of certain ulcers and diseases of the lip, reputed to be cancerous. (*Stark, De Cancro Labii Inferioris.*) Of this essay, Professor Langenbeck speaks in high terms. The following formula is recommended. "℞. Arsenici Albi drachm. dimid. Aq. comm. stillaticiæ unc. sex. M. Digerantur vase vitreo clauso in balneo arenæ justi caloris ope per horas sex, tum adde Potassæ Carbonatis puræ drachm. dimid. antea solut. in aq. Cinnamom. simpl. unc. duab. M. Digerantur denuo per aliquot horas in loco temperato. Hac solutione bis terve quotidie ad guttas 8—10—15. utimur."

When cancer takes place, it is usually in the lower, and very seldom in the upper lip.

The disease sometimes puts on the appearance of an ulcerated, wart-like excrescence, occasionally acquiring a considerable size. Sometimes it is seen in the form of a very destructive ulcer, which consumes the surrounding substance of the lip; and, in other examples, the disease resembles a hard lump, which, at length, ulcerates. The disease, in its infancy, is often no more than a pimple, which gradually becomes malignant. Whenever there is reason to believe, that the disease is of an unyielding cancerous nature, and it does not soon give way to arsenic, hemlock, and mercurials, the sooner it is extirpated the better. For this purpose, some surgeons admit the propriety of using caustic, when the whole disease can be completely destroyed by one application. But as the action of caustic is not capable of being regulated with so much precision as the extent of a wound can be, and as caustic will not allow the parts to be united again, the knife is the only justifiable means, especially as it occasions also less pain. Two incisions are to be made, meeting at an angle below (supposing it to be the lower lip,) and including the whole of the disease. The sides of the wound are then to be united by the twisted suture. (See *Hare-lip.*) When the affection is extensive, however, the surgeon is frequently necessitated to remove the whole of the lip, or too much of it to admit of the above plan being followed. This circumstance is particularly unpleasant, as the patient's spittle can only be prevented from continually running over his chin by some artificial contrivance. The deformity also is very great, and pronunciation and swallowing can only be imperfectly performed.

LIPPITUDO. (from *lippus,* blear-eyed.) *Blearedness.* The ciliary glands, and lining of the eyelids, only secrete, in the sound state, a mere sufficiency of a sebaceous fluid to lubricate the parts in their continual motions. But, it sometimes happens, from disease, that this sebaceous matter is secreted in too great a quantity, and glues the eyelids together during sleep, so that, on waking, they cannot be easily separated. Hence, the margin of the eyelids becomes red all round, and the sight itself even weakened.

The best remedies are the unguentum hydrargyri nitrati, smeared, at night, on the edges and inside of the eyelid with a hair pencil, after being melted in a spoon; the unguentum tutiæ, applied in the same way; and a collyrium, composed of ℈j. of the sulphate of zinc in v℥iij. of rosewater.

When alterative medicines are requisite, a grain of calomel may be exhibited daily, or the compound calomel pill, containing one grain of calomel, one of sulphur antimonii præcipitatum, and two of guaiacum, put together with soap.

Persons who have lippitudo and cataracts together, bear couching much better than one would expect from the appearance of the eyes in that disease; and Mr. Hey never rejects a patient on this account, provided such state is habitual. (*Practical Observations, p.* 51.) Scarpa, however, recommends the lippitudo to be removed before the operation is undertaken.

LIQUOR AMMON. ACET. (L. P.)—This is given in the dose of half an ounce in many surgical cases, in which the object is to keep up a gentle perspiration.

LIQUOR ARSENICALIS.—℞. Arsenici Oxydi præparati in pulverem subtilissimum triti, Potassæ Subcarbonatis ex tartaro, singulorum gr. 64. Aq. distill. ℔j coque simul in vase vitreo, donec arsenicum omne liquetur. Liquori frigefacto adjice Spiritûs Lavandulæ com. ʒiv. Denique adjice insuper Aq. distil. quantum satis sit, ut mensuram octarii accurate impleat. For internal use the dose is iv. drops gradually increased to xx. twice a day. It is frequently given in cases of anomalous ulcers, and cancerous affections of the lip. It is also used as an external application in similar cases, and especially in hospital gangrene. (See *Arsenic,* and *Hospital Gangrene.*)

LIQUOR CALCIS (L. P.)—Sometimes used as an astringent injection, or lotion, in cases of gonorrhœa, gleet, psora, porrigo, abscesses, &c.

LIQUOR CUPRI SULPHATIS CAMPHORATA.—℞. Cupri sulphatis. Boli Gallici sing. unc. ss. Camphoræ drach. j. Aquæ ferventis lib. iv. Boiling water is to be added to the other ingredients, and the liquor filtered when cold. It is chiefly employed in a diluted state, as a collyrium; but it may also prove of service as an application to foul ulcers.

When used for the cure of the purulent ophthalmy, the lotion is to be injected under the eyelids, by means of a blunt syringe, and, if necessary, the application may be repeated once or twice every hour. (See *Ophthalmy.*)

LIQUOR POTASSÆ SUBCARBONATIS (L. P.)—This remedy is principally deserving of notice on account of its having been given with a view of dissolving calculi in the bladder, so as to remove the necessity of performing the dangerous and painful operation of lithotomy. The principle, on which the liquor potassæ subcarbonatis acts, is by the potassa attracting and combining with the uric acid of the calculus. The medicine may be exhibited in doses of 20 or 40 drops, or of a dram, in a basin of gruel. Experience does not seem to justify the indulgence of much hope, with regard to the complete efficacy of the medicine in dissolving urinary calculi, and on some kinds it is not calculated to act at all, even on chymical principles; but, it would appear, from the reports of writers, that it has often materially palliated the pain which attends the presence of a stone in the bladder. Some practitioners place more confidence in the liquor potassæ.

LIQUOR KALI ARSENICATI.—℞. Kali Arsenicati grana duo. Aquæ Menthæ Sativæ uncias quatuor. Spiritus Vinosi tenuioris unciam. Misce et cola. Two drams of this may be given thrice a day in cases of cancer. My friend, Mr. Barnes, of Exeter, when formerly a student at St. Bartholemew's, showed me a case of lupus, or noli me tangere, which was greatly benefited by this remedy externally applied. Mr. Barnes was using the lotion with double the proportion of arsenic. There are many ulcerations round the roots of the nails of the fingers and toes, to which Plunket's caustic is sometimes applied; but, the liquor kali arsenicati would, in all probability, be quite as efficacious, and, certainly, it is a neater application.

LIQUOR POTASSÆ (L. P.) This has been given with a view of dissolving urinary calculi, in considerable doses, for a length of time. The trials, however, have not proved so successful as could have been wished, nor is the exhibition of so active a remedy unattended with disadvantageous consequences to the system; for which reason, soda water and other alkaline waters, supersaturated with fixed air, have of late been much substituted.

The proper dose of the liquor potassæ at first, is from ten to twenty drops twice a day, in some linseed tea. At St. Thomas's Hospital, the following is the way in which the liquor potassæ is prescribed:—℞. Liq. Potassæ ℥i. Aquæ Distillatæ ℥ij. Misce. Dosis Drachma una bis die ex unciis quatuor infusi lini.

LIQUOR PLUMBI ACETATIS (L. P.) —Is extensively used, largely diluted with water, as an application to inflamed parts. (See *Inflammation.*) One dram to a quart of water is quite strong enough for common purposes. Mr. Justamond and Dr. Cheston used to apply it, mixed with an equal proportion of a spirit resembling the tinctura ferri muriati, to the edges of cancerous sores.

LITHONTRIPTICS. (from λιθος, a stone; and θρυπτω, to break.) Medicines for dissolving stone in the bladder. (See *Urinary Calculi.*)

***LITHOTOMY.** (from λιθος, a stone; and τεμνω, to cut.) The operation of cutting into the bladder, in order to extract a stone.

It has been correctly remarked, that no single operation of surgery has attracted so much notice, or had so much written upon it, as lithotomy. A full and minute account of the sentiments of every writer, who has treated of the subject, and a detail of the infinite variety of particular modes of making an opening into the bladder, would occupy as many pages as are allotted to the whole of this dictionary. It must be my endeavour, therefore, rather to describe what is most interesting and important, than pretend to offer an article which is to comprehend every thing.

May I be allowed to premise, that throughout the following columns, I suppose the reader to be already well informed of all that relates to the anatomy of the bladder and adjacent parts, and that of the perinæum? Without correct knowledge of this kind, a man must be presumptuous indeed, to set himself up for a good lithotomist; and if he were to distinguish himself at all, it would only be by the murders which he committed, while his successful feats, if he achieved any, could redound little to his honour, since every young student would soon find out, that they were not the effect of science, but of mechanical habit and imitation. I would particularly recommend every one, who wishes to understand well the anatomy of the pelvic viscera and perinæum, with a view to lithotomy, in the first place to dissect those parts himself, and then avail himself of the valuable instructions to be derived on the subject from Winslow's Anatomy; Le Dran's Parallèle de Tailles; Le Cat's Deuxième Recueil, planche 5 et 6; Haller's Inst. Med. of Boerhaave, and Elem. Physiol. T. 5; Morgagni, Adversar. Anat. 3, p. 82, 97; Camper's plates; Sabatier's Anatomy; John Bell's Principles of Surgery; Deschamp's Traité Historique, &c. de l'Operation de la Taille, T. 1, p. 7, &c.; and Langenbeck's description of the parts, and the matchless plate which he has given of them in his valuable work on lithotomy, cited at the end of this article.

A few subjects which are closely connected with the present, will be found in other parts of this dictionary. For instance, the nature of stones in the bladder will be considered under the head of *Urinary Calculi,* where also will be seen some observations on lithontriptics. The manner of searching for the stone, or, as it is now more commonly expressed, of sounding, will be explained in the article *Sounding.*

Here I shall principally confine myself to the symptoms of the disease, and the chief methods of executing the much diversified operation of lithotomy.

SYMPTOMS OF THE STONE.

The symptoms of a stone in the bladder are, a sort of itching along the penis, particularly at the extremity of the glans; and hence the patient often acquires a habit of pulling the prepuce, which becomes very much elongated; frequent propensities to make water, and go to stool; great pain in voiding the urine, and difficulty of retaining it, and often of keeping the feces from being discharged at the same time; the stream of urine is liable to stop suddenly, while flowing in a full current, although the bladder is not empty, so that the fluid is expelled by fits, as it were; the pain is greatest towards the end of, and just after, the evacuation; there is a dull pain about the neck of the bladder, together with a sense of weight, or pressure, at the lower part of the pelvis; and a large quantity of mucus is mixed with the urine; and, sometimes, the latter is tinged with blood, especially after exercise. (*Sharp, Earle, Sabatier.*)

Frequently (says Deschamps) a patient will have a stone in his bladder a long while without the occurrence being indicated by any symptom or accident. Most commonly, however, the presence of the stone is announced by pain in the kidneys, more especially in adults and old persons, children scarcely ever suffering in this way, because in them the stone is hardly at all detained in the kidneys and ureters, but descends immediately into the bladder, the preceding tubes being in them more dilatable, and the rudiment, or nucleus of the stone smaller.

It seldom happens, that calculous patients void blood with their urine, before the symptoms and accidents, usually caused by the stone, have taken place. It is not till after the foreign body has descended into the bladder, acquired some size, and presented itself at the orifice of that viscus, that pain is occasioned, particularly when the surface of the stone is unequal. The patient then experiences frequent inclination to make water, attended with pain. The jolting of a carriage, riding on horseback, and much walking, render the pain more acute. The urine appears bloody, and its course is frequently interrupted, and sabulous matter and particles of stone are sometimes discharged with it. The want to make water becomes more frequent and more insupportable. The bladder is irritated, and inflames; its parietes become thickened and indurated; and its diameter is lessened. A viscid, more or less, tenacious matter is observed, in greater or lesser quantity, in the urine, and is precipitated to the bottom of the vessel. The urine becomes black and putrid, and exhales an intolerable alkalescent smell, which is perceived at the very moment of the evacuation, and is much stronger a little while afterward. The patient can no longer use any exercise, without all his complaints being redoubled. Whenever he walks in the least, the urine becomes bloody; the pain about the hypochondria, which was dull in the beginning, grows more and more acute; the ureters and kidneys participate in the irritation with the bladder; they inflame and suppurate, and very soon the urine brings away with it purulent matter. The fever increases, and changes into one of a slow type; the patient loses his sleep and appetite; becomes emaciated and exhausted; and death at length puts a period to his misery. (See *Traité Historique et Dogmatique de l'Operation de la Taille par J. F. L. Deschamps, T. 1, p.* 163, *Paris*, 1796.)

It is acknowledged by the most experienced surgeons, that the symptoms of a stone in the bladder are exceedingly equivocal, and may be produced by several other disorders. "Pain in making water, and not being able to discharge the urine without the feces, are common consequences of irritation of parts about the neck of the bladder, from a diseased prostate gland, and other causes. The urine stopping in a full stream is frequently caused by a stone altering its situation, so as to obstruct the passage; but the same thing may happen from a tumour, or fungus in the bladder. I have seen an instance of this, where a tumour, hanging by a small pedicle, would sometimes cause obstruction, and by altering the posture, would retire, and give a free passage. The dull pain at the neck of the bladder, and the sensation of pressure on the rectum, are frequently owing to the weight of the stone, &c.; but these may proceed from a diseased enlargement of the prostate gland. Children generally, and grown persons frequently, are subject to a prolapsus ani, from the irritation of a stone in the bladder; but it will likewise be produced by any irritation in those parts." (*Earle.*) The rest of the symptoms are equally fallacious; a scirrhous enlargement of the os tincæ, and disease of the kidneys may occasion a copious quantity of mucus in the urine, with pain, irritation, &c. "The least fallible sign (says Sir James Earle) which I have remarked, is the patient making the first portion of urine with ease, and complaining of great pain coming on when the last drops are expelled. This may readily be accounted for, from the bladder being at first defended from contact with the stone by the urine, and, at last, being pressed naked against it. But, to put the matter out of all doubt, and actually to prove the existence of a stone in the bladder, we must have recourse to the operation of sounding."

A stone in the ureter, or kidneys, or an inflammation in the bladder from any other cause, will sometimes produce the same effects; but if the patient cannot urine, except in a certain posture, it is almost a sure sign that the orifice of the bladder is obstructed by a stone. If he finds ease by pressing against the perinæum with his fingers, or sitting with that part upon a hard body, there is little doubt the ease is procured by taking off the weight of the stone; or, lastly, if, with the other symptoms, he thinks he can feel it roll in his bladder, it is hardly possible to be mistaken; however, the only sure judgment is to be formed from searching. (*Sharp on the Operations.*)

An enlarged prostate gland is attended with symptoms resembling those of a stone in the bladder; but with this difference, that the motion of a coach, or horse, does not increase the grievances, when the prostate is affected, while it does so in an intolerable degree in cases of stone. It also generally happens, that the fits of the stone come on at intervals; whereas, the pain from a diseased prostate is neither so unequal, nor so acute. (*Sharp in Critical Inquiry, p.* 165, *Edit.* 4.)

Though, from a consideration of all the circumstances above related, the surgeon may form a *probable* opinion of there being a stone in the bladder, yet he must never presume to deliver a *positive* one, nor ever be so rash as to undertake lithotomy, without having greater reason for being certain that there is a stone to be extracted. Indeed, all prudent surgeons, for centuries past, have laid it down as an invariable maxim, never to deliver a decisive judgment, nor undertake lithotomy, without having previously introduced a metallic instrument called a sound, into the bladder, and plainly felt the stone.

Within the last five years, at least seven cases have come to my knowledge, and at two of them I was present, where the patients were subjected to all the torture and perils of this operation, without there being any calculi in their bladders. The maxim, therefore, cannot be too strictly enforced, that the operation ought never to be attempted, unless the stone can be *distinctly* felt with the sound or staff. In one of the examples, of which I was a spectator, not only the symptoms, but the feel, which the sound itself communicated when in the bladder, made the surgeons imagine, that there was a calculus, or some extraneous body in this organ. Most of the above cases, I understand, recovered, which may be considered fortunate; because when the stone cannot be found, the disappointed operator is apt to persist in roughly introducing his fingers, and a variety of instruments, so long, in the hope of catching what cannot be got hold of, that inflammation of the bladder and peritoneum is more likely to follow, than when a stone is actually present, soon taken out, and the patient kept only a short time upon the operating table.

In a valuable practical work is recorded an instance, in which what is called a horny cartilaginous state of the bladder, made the sound communicate a sensation, like that arising from the instrument actually touching a stone, and the surgeon attempted lithotomy. This patient unfortunately died in twenty-four hours. (See *Desault's Parisian Chir. Journal, Vol.* 2, *p.* 125.)

However, were the symptoms most unequivocal, there is one circumstance which would always render it satisfactory to touch the stone with an instrument, just *before* venturing to operate; I mean the possibility of there actually being a stone in the bladder to-day, and *not to-morrow.* It is said, that stones are occasionally forced, by the violent contractions of the bladder, during fits of the complaint, between the fasciculi of the muscular coat of this viscus, together with a portion of the membranous lining of the part, so as to become what is termed encysted. The opening into the cyst is frequently very narrow, so that the stone is much bigger than the orifice of the cyst, in consequence of which it is impossible to lay hold of the extraneous body with the forceps, and the operation would necessarily become fruitless. (*Sharp's Critical Inquiry, p.* 228, *Edit.* 4.)

In the article *Urinary Calculi*, I have noticed the probability of this having occurred in some of the instances in which Mrs. Stevens's medicine was supposed to have actually dissolved the stone in the bladder; for an encysted stone is not likely to be hit with the sound, nor to cause any inconvenience, compared with what a calculus, rolling about in the bladder, usually occasions.

It is remarked by Deschamps, that when the stone is lodged in an excavated corner of the bladder, in a particular cyst, or depression; when it projects but very little; when it cannot shift its situation in the bladder, so as to fall against the orifice of this viscus; and when it is also smooth, polished, and light; the patient may then have it a long while without experiencing any afflicting symptoms. He may even live to an advanced age, if not without some degree of suffering, at all events, with such pain as is very supportable. Daily experience proves, that persons may live a considerable time, with one, two, or even three stones in the bladder, and, during the whole of their lives, have not the least suspicion of the existence of these foreign bodies.

According to Deschamps, this must have been the case of M. Portalieu, a tailor. This individual, eighty years old, was frequently attacked with a retention of urine from paralysis, and Deschamps introduced a sound several times, and distinctly felt a stone in the bladder. The patient, however, never had any symptom of the disorder, nor even at the end of two years from the time when Deschamps was first consulted. Very large and exceedingly rough stones have also been found in the dead bodies of persons who had never complained of the symptoms of the disease. Thus, at the anatomical Theatre of La Charité, Richerand found an enormous mulberry stone in the bladder of a person who died altogether of another disease, and never had any symptoms that led to the suspicion of the stone. (*Nosographie Chir. T.* 3, *p.* 530, *Edit.* 4.) But cases of this kind must be rare, because it is well known that the pain, which a stone produces, is less in a ratio to its size than to its shape and situation. A small stone, owing to its situation, may be more painful than an enormous calculus which fills the bladder, as is proved by the following case, by Deschamps.

Pechet, a watchmaker, until the age of forty-five, had never had any infirmity, except that of not being able to retain his water a long while. One day, while he was carrying a very heavy clock, he made some exertions which probably, by changing the situation of the calculus, caused at the instant an acute pain in the hypogastric region. Symptoms of the stone soon came on; the pain became intolerable, and the patient went into the Hôpital de la Charité. He was sounded; the stone was felt, and judged to be of considerable size. The incision in the neck of the bladder not sufficing for its extraction, the patient was put to bed again. The next morning he was operated upon above the pubes by Frère Come, who extracted an oval calculus that weighed twenty-four ounces. The patient died four and twenty hours after this second operation. This case proves, then, that very large stones may lie in the bladder without occasioning any serious complaints, since the preceding patient apparently had had such a calculus a long time without suffering inconvenience from it, and it seems likely that he might have continued well still longer, had it not been for the accidental effort which first excited the symptoms. (*Deschamps, in Traité Historique, &c. de la Traille, Tom.* 1, *p.* 166, 167.)

A priest, in whom Morand had ascertained the presence of a stone by sounding, could not be persuaded that his case was of this nature. However, he bequeathed his body at his decease to the surgeons, and the examination of the bladder fully justified Morand's prognosis. The celebrated D'Alembert also died with a stone in his bladder, having always refused to be sounded. (*Richerand, Op. cit. T.* 3, *p.* 538.)

A question may here suggest itself: ought lithotomy to be practised where calculi are under a certain size? Certainly not, because they frequently admit of being discharged with the urine, without any operation at all, even from the male subject, and how much more likely this is to happen in females, must be plain to every body who recollects the direct course, the shortness, ample size, and dilatability of the meatus urinarius. On this subject, various facts will be adverted to in considering the operation of lithotomy in women. Sometimes, also, when a calculus is too large to pass completely through the male urethra, it lodges in this passage, where it may be more safely cut upon and removed, than from the bladder; and sometimes it is actually discharged by an ulcerative process. Thus, Dr. R. A. Langenbeck has published an example in which a stone made its way out by ulceration, and was discharged immediately behind the testes. (See *J. C. Langenbeck, Bibl. für die Chir. Gött.* 1809.) And G. Coopmans has recorded an almost incredible case, in which a calculus, weighing five ounces, one drachm and a half, when being dried, was discharged on the left side of the urethra of an elderly man, a little below the glans penis. In fact, without some further explanation, this case would be pronounced impossible; but it should be recollected, that after a small calculus has made its way out of the urethra by ulceration, if the urine have still access to it, it will continue to increase in size in its new situation; and this is what happened in the present example; for the extraneous body, when first felt externally, was not larger than a pea. The calculus is now preserved in Camper's museum. (*G. Coopmans, Neurologia,* 8vo. *Franequeræ,* 1795.) I am not meaning, however, to recommend surgeons to let the patient encounter all the sufferings which must inevitably attend leaving the business to be completed by ulceration, because, as soon as the nature of the case is known, an incision should be made into the swelling, and the foreign body taken out. In many cases, also, small calculi may be voided by dilating the male urethra with elastic gum catheters of very large diameter, and then desiring the patient to expel his urine with considerable force, a plan which Baron Larrey has found repeatedly answer. Of late, Mr. Weiss, surgical instrument maker, in the Strand, has invented a kind of sound, the end of which, when in the bladder, admits of being opened, like a pair of forceps, and closed again, so as to grasp calculi under a certain size, and draw them out through the urethra. The instrument has been tried with great success by Mr. A. Cooper, who removed with it from one patient at different times 84 calculi. And, even when the stone cannot be drawn completely out of the urethra, but only into this passage, it is a great advantage, because, then it may easily be cut down to, and extracted, without any wound or injury of the bladder. (See *A. Cooper in Med. Chir. Trans. Vol.* 11.)

I shall next describe the various methods of cutting for the stone, beginning with the most ancient, called the *apparatus minor,* and ending with the modern proposal of employing a knife in preference to a gorget.

OF THE APPARATUS MINOR, CUTTING ON THE GRIPE, OR CELSUS'S METHOD.

The most ancient kind of lithotomy was that practised upwards of two thousand years ago by Ammonius, at Alexandria, in the time of Herophilus and Erasistratus, and by Meges, at Rome, during the reign of Augustus; and being described by Celsus, is named *Lithothomia Celsiana.* From cutting directly on the stone, fixed by the pressure of the fingers in the anus, it has been called *cutting on the gripe,* a knife and a hook being the only instruments used. The appellation of the *lesser apparatus* was given to it by Marianus, to distinguish it from a method which he described, called the *apparatus major,* from the many instruments employed.

The operation was done in the following way. The rectum was emptied by a clyster a few hours previously; and, immediately before cutting, the patient was desired to walk about his chamber, to bring the stone down to the neck of the bladder; he was then placed in the lap of an assistant, or secured in the manner now practised in the lateral operation. The surgeon then introduced the fore and middle fingers of his left hand, well oiled, into the anus; while he pressed with the palm of his right hand on the lower part of the abdomen above the pubes, in order to promote the descent of the stone. With the fingers the calculus was next griped, pushed forward toward the neck of the bladder, and made to protrude, and form a tumour on the left side of the perinæum. The operator then took a scalpel, and made a lunated incision through the skin and cellular substance, directly on the stone, near the anus, down to the neck of the bladder, with the horns towards the hip. Then, in the deeper and narrower part of the wound, a second transverse incision was made on the stone into the neck of the bladder itself, till the flowing out of the urine showed that the incision exceeded in some degree the size of the stone. The calculus being strongly pressed upon with the fingers, next started out of itself, or was extracted with a hook for the purpose. (*Celsus, lib.* 7, *cap.* 26. *J. Bell's Principles, Vol.* 2, *p.* 42. *Allan on Lithotomy, p.* 10.)

The objections to cutting on the gripe, are; the impossibility of always dividing the same parts; for those which are cut will vary, according to the degree of force employed in making the stone project in the perinæum. When little exertion is made, if the incision be begun just behind the scrotum, the urethra may be altogether detached from the prostate: if the stone be much pushed out, the bladder may be entered beyond the prostate, and both the vesiculæ seminales and vasa deferentia inevitably suffer. Lastly, if the parts are just sufficiently protruded, the bladder will be cut upon its neck, through the substance of the prostate gland. (*Allan on Lithotomy. Burns, in Edinb. Surg. Journal, No. XIII. J. Bell, Vol.* 2, *p.* 59.)

The preceding dangers were known to Fabricius Hildanus, who attempted to obviate them by cutting on a staff, introduced through the urethra into the bladder. He began his incision in the perinæum, about half an inch on the side of the raphe; and he continued the cut, inclining the knife as he proceeded towards the hip. He continued to divide the parts till he reached the staff; after which he enlarged the wound to such an extent, as permitted him easily with a hook to extract the stone, which he had previously brought into the neck of the bladder, by pressure with the fingers in the rectum. (*Burns.*) In this way Mr. C. Bell has operated with success. (*J. Bell.*)

The apparatus minor, as practised by Fabricius, with the aid of a staff, is certainly a very simple operation on children, and some judicious surgeons doubt the propriety of its present neglected state. You cut, says an eminent writer, upon the stone, and make of course, with perfect security, an incision exactly proportioned to its size. There is no difficult nor dangerous dissection; no gorget, nor other dangerous instrument, thrust into the bladder, with the risk of its passing betwixt that and the rectum; you are performing, expressly, the lateral incision of Raw and Cheselden, in the most simple and favourable way. The *prisca simplicitas instrumentorum* seems here to have been deserted, for the sake of inventing more ingenious and complicated operations. (*J. Bell.*)

Celsus has delivered one memorable precept in his description of lithotomy, *ut plaga paulo major quam calculus sit;* and he seems to have known very well, that there was more danger from lacerating, than cutting the parts.

The simplicity of the apparatus minor, however, formerly emboldened every quack to undertake its performance; and as this circumstance was necessarily followed by the evils and blunders, unavoidably originating from ignorance, and also diminished the emolument of regular practitioners, it became the grand cause of the downfall of this operation. (See *Heister on this subject.*) It was longer practised, however, than all the other methods, having been continued to the commencement of the 16th century; and it was performed at Bourdeaux, Paris, and other places in France, on patients of all ages, by Raoux, even as late as 150 years ago. Frère Jacques occasionally had recourse to it; and it was successfully executed by Heister. (*Part* 2, *chap.* 140.) A modern author recommends it always to be preferred on boys under fourteen. (*Allan, p.* 12.)

APPARATUS MAJOR,

So named from the multiplicity of instruments employed; or the Marian method, from having been first published by Marianus Sanctus, in 1524, as the invention of his master, Johannes de Romanis. (See *Marianus de lapide Vesicæ per incisionem extrahendo.*)

This operation, which came into vogue, as we have noticed, from avaricious causes, was rude and painful in its performance, and very fatal in its consequences. The apology for its introduction was the declaration of Hippocrates, that *wounds of membranous parts are mortal.* It was contended, however, that such parts might be dilated with impunity; and on this principle of dilatation, Romanis invented a complex and dangerous plan of operating; one very incompetent to fulfil the end proposed; one, which, though supposed only to dilate, really lacerated the parts. (*Burns.*)

The operator, kneeling on one knee, made an incision with his razor along the perinæum, on one side of the raphe; and feeling with his little finger for the curve of the staff, he opened the membranous part of the urethra; and fixing the point of the knife in the groove of his staff, gave it to an assistant to hold, while he passed a probe along the knife into the groove of the staff, and thus into the bladder. The urine now flowed out, and the staff was withdrawn. The operator next took two conductors, a sort of strong iron probes; one, named the female conductor, having in it a groove, like one of our common directors; the other the male conductor, having a probe point, corresponding with that groove. The grooved, or female conductor, being introduced along the probe into the bladder, the probe was withdrawn, and the male conductor passed along the groove of the female one, into the bladder. Then commenced the operation of dilating. The lithotomist took a conductor in each hand, and by making their shafts diverge, dilated, or, in plain language, tore open the prostate gland. (*J. Bell.*)

It would be absurd in me to trace the various dilating instruments contrived for the improvement of this barbarous operation, by the Colots, Maréchal, Le Dran, Paré, &c. Among the numerous glaring objections to the apparatus major, we need only notice the cutting the bulb of the urethra, not dividing the membranous part of the urethra, nor the transversalis perinæi muscle, which forms a kind of bar across the place where the stone should be extracted; violent distention of the membranous part of the urethra and neck of the bladder; laceration of these latter parts; large abscesses, extravasation of urine, and gangrene; frequent impotency afterward, and extensive fatality. Bertrandi even saw the urethra and neck of the bladder torn from the prostate by the violence employed in this vile method of operating. (*Operations de Chir. p.* 169.) Paré, Le Dran, Le Cat, Mery, Morand, Mareschal, Raw, and all the best surgeons in Europe, most strangely practised this rash method, for two hundred years, till Frère Jaques, in 1697, taught at Paris the original model of lithotomy, as commonly adopted at the present day.

OF THE HIGH OPERATION.

This method of cutting for the stone was first published in 1556, by Pierre Franco, who, in his Treatise on Hernia, Ed. 1, says, he once performed it on a child with success, but discourages the farther practice of it. After him, Rossetus recommended it, with great zeal, in his book entitled *Partus Cæsarius*, printed in 1591; but he never performed the operation himself. Tolet mentions its having been tried in the Hôtel Dieu, but without entering into the particular causes of its discontinuance, merely says, that it was found inconvenient. About the year 1719, it was first done in England, by Mr. Douglas; and after him, practised by others. (*Sharp's Operations.*)

The patient being laid on a square table, with his legs hanging off, and fastened to the sides of it by a ligature, passed above the knee, his head and body lifted up a little by pillows, so as to relax the abdominal muscles, and his hands held steady by some assistants; as much barley-water as he could bear, which was often about eight ounces, and sometimes twelve, was injected through a catheter, into the bladder.

The bladder being filled, an assistant, in order to prevent the reflux of the water, must grasp the penis, the moment the catheter is withdrawn, holding it on one side, in such a manner as not to stretch the skin of the abdomen; then, with a round-edged knife, an incision, about four inches long, was made between the recti and pyramidal muscles, through the membrana adiposa, as deep as the bladder, bringing its extremity almost down to the penis; after this, with a crooked knife, the incision was continued into the bladder, and carried a little under the os pubis; and immediately upon the water's flowing out, the forefinger of the left hand was introduced, which directed the forceps to the stone. (*Sharp's Observations.*) Sabatier condemns making the cut in the bladder from below upward, lest the knife injure the peritonæum. (*Méd. Opératoire, T.* 3, *p.* 160.)

Although this is one of the easiest, and to all appearance, the safest method of operating, several objections soon brought it into disuse. 1. The irritation of a stone often causes such a thickened and contracted state of the bladder, that this viscus will not admit of being distended so as to rise above the pubes. 2. If the operator should break the stone, the fragments cannot be easily washed away, and remaining behind will form a nucleus for a future stone. 3. Experience has proved, that the high operation is very commonly followed by extravasation of urine, attended with suppuration and gangrenous mischief in the cellular membrane of the pelvis. This happens because the urine more readily escapes out of the wound in the bladder, than through the urethra; and also because when the bladder contracts, and sinks behind the os pubis, this wound ceases to be parallel to that in the linea alba and integuments, and becomes deeper and deeper. For the prevention of these ill consequences, says Sabatier, it will be in vain to make the patient lie in a horizontal posture, and keep a catheter introduced, as Rousset and Morand recommended: experience evincing, that the bad effects are neither less frequent, nor less fatal. (See *Médecine Opératoire, T.* 3, *p.* 161, *Edit.* 2.) And Sir Everard Home confesses, that while the high operation for the stone had no other channel but the wound for carrying off the urine, it seemed to him a method which ought never to be adopted; "the urine almost always insinuating itself into the cellular membrane behind the pubes, producing sloughs, and consequently abscesses." (*On Strictures, Vol.* 3. *p.* 359, *8vo. Lond.* 1821.) 4. The danger of exciting inflammation of the peritonæum. 5. The injection itself is exceedingly painful, and however slow the fluid be injected, the bladder can seldom be dilated enough to make the operation absolutely secure; and when hastily dilated (to say nothing of the possibility of its bursting,) its tone may be destroyed. (See *Sharp, Allan, Sabatier, &c.*)

In many men, however, we know by searching, that the bladder is very large, so that there is no risk of meeting with it in a contracted state, and the objection is of no weight, when the bladder extends a considerable way above the pubes, and will admit a large quantity of injection. Stones are sometimes known to be of large size, and they are less likely to be broken in this, than any other mode of lithotomy, so that the objection of the difficulty of extracting small calculi and fragments is less forcible. Mr. Carpue even declares, that if the stone should break, the particles can be extracted with much greater certainty, in less time, and with considerably less pain, than in the lateral operation. (*History of the High Operation, p.* 154.)

I may add, that some judicious surgeons of the present day are decidedly of opinion, that when a stone in the bladder is known to be very large, no attempt ought ever to be made to extract it from the perinæum. Professor Scarpa also declares, that the lateral operation should not be practised, when the calculus exceeds twenty lines in its small diameter. (See *Memoir on the Cutting Gorget of Hawkins, p.* 8, *transl. by Briggs.*) In such cases, it is true, the surgeon might do the lateral operation, and try to break the stone. But it is a question whether one ought not to prefer to this unpleasant, unsatisfactory proceeding, the high operation. I speak particularly of cases, in which the stone is known to be of very large dimensions before any operation is begun. Were the lateral operation commenced, the stone, if too large for extraction, must of course be broken; for, it is then too late to adopt the high operation with advantage. That such things have been done, however, and yet the patients escaped, is a truth, which cannot be denied. Deschamps mentions an instance, in which M. Lassus, after using Hawkins's gorget, could not draw out the calculus, and he therefore immediately did the high operation, and the patient recovered. Indeed, the first example of the high operation on record was done by Franco under similar circumstances, and the patient was saved. I have also heard of a modern French surgeon, who began with the lateral operation, but, finding a large calculus, ended with performing the high operation, without the least delay or hesitation: the patient died.

Mr. Samuel Sharp, an excellent practical surgeon in his time, after noticing with great impartiality the objections which were then urged against the high operation says, that he should not be surprised, if hereafter it were revived and practised with success; an observation, which implied, that Mr. Sharp himself foresaw, that the method was capable of being so improved, as to free it from its most serious inconveniences. In fact, since his time, various attempts have been made to introduce the high operation anew, and upon improved principles. Frère Côme, in particular, knew very well, that there were circumstances, as for instance, a calculus above a certain size, disease of the urethra, or prostate gland, &c., where the lateral operation was liable to great difficulties and disadvantages, and where the high operation, if it could be perfected, would be a fitter and safer mode of proceeding. However, it was only in such cases, and not in all, that Frère Côme thought the method better than the lateral operation. He had also discernment enough to perceive, that it was extremely desirable to invent some means, whereby the painful and hurtful distention of the bladder, for the purpose of making this organ rise behind the pubes, would be rendered unnecessary, at the same time, that some measure was adopted for letting the urine have a more depending outlet, than the wound in the hypogastric region. In the former editions of this dictionary, the error was committed of representing Côme to have cut the neck of the bladder, as well as its fundus; a mistake, which I first became aware of upon the perusal of Mr Carpue's interesting work on lithotomy. The fact is, that Côme did not wound the bladder in two places; but operated after the following way: he first introduced through the urethra into the bladder a staff, which was then held by an assistant. An incision, an inch in length, was now made in the perinæum in the same direction, as in the lateral operation. Another incision was made in the membranous part of the urethra along the groove of the staff, as far as the prostate gland. A very deeply grooved director was then passed along the staff into the bladder, and the latter instrument was withdrawn. By means of the director, a *sonde à dard*, or kind of catheter furnished with a stilette, was now introduced into the bladder, and, when this had been done, the director was taken out. An incision was then made, about three or four inches in length, just above the symphysis of the pubes, down to, and in the direction of the linea alba. A trocar, in which there was a concealed bistoury, was next passed into the linea alba, close to the pubes, and the blade of the knife then started from its sheath towards the handle of the instrument, while its other end remained stationary. In this manner, the lower part of the linea alba was cut from below upwards, and an aperture was made, which was now enlarged with a probe-pointed curved knife, behind which a finger was kept so as to push the peritonæum out of the way. Côme then took hold of the *sonde à dard* with his right hand, and elevating its extremity, lifted up the fundus of the bladder, while with the fingers of his left hand he endeavoured to feel its extremity in the wound. As soon as the end of the instrument was perceived, it was taken hold of between the thumb and middle finger, the peritoneum was carefully kept up out of the way, and the stilette was pushed by an assistant from within outwards, through the fundus of the bladder. The bladder being thus pierced, the operator introduced into a groove in the stilette a curved bistoury, with which he divided the front of the bladder from above downwards, nearly to its neck. He then passed his fingers into the opening, and keeping up the bladder with them, withdrew the *sonde à dard* altogether. But, as it was useful that both his hands should be free, the bladder was prevented from slipping away by means of a suspensory hook held by an assistant as soon as the opening was found to be already ample enough, or had been enlarged to the necessary extent. Côme next introduced the forceps, took out the stone, and passed a cannula, or elastic gum catheter through the wound in the perinæum into the bladder, so as to maintain a ready outlet for the urine, and divert this fluid from the wound in the bladder. In women, of course, the catheter was passed through the meatus urinarius. And, I ought here to observe, that Côme thought the high operation especially adviseable for females, because his experience had taught him, that the division, or dilatation, of the meatus urinarius was generally followed by an incontinence of urine. (See *Nouvelle Méthode d'extraire la Pierre de la Vessie par dessus le Pubis, &c.* 8vo. *Bruxelles*, 1779.)

Another modification of the high operation was suggested by Deschamps, who, instead of opening the membranous part of the urethra as Côme did, perforated the bladder from the rectum, and through the cannula of the trocar effected the same objects, which the latter lithotomist accomplished by means of the incision in the membranous part of the urethra. Of the two plans, that devised by Côme is unquestionably the best, because not attended with a double wound of the bladder; a thing which, I conceive, must always be highly objectionable.

Dr. Souberbielle, who practices Côme's method, introduces a silver wire through the cannula of the *sonde à dard*, and passes it through the wound made in the linea alba. The wire is then held while the *sonde à dard* is withdrawn, and a flexible gum-catheter is passed by means of the wire into the bladder through the wound in the membranous part of the urethra. The wire is now withdrawn, and the catheter is fixed with tapes, passed round the thighs and pelvis, and a bladder is tied to it for the reception of the urine. "A piece of soft linen, half an inch wide, and six or eight inches long, is to be introduced, by means of a pair of forceps into the bottom of the bladder;" the object of which slip of linen is to carry off such urine, as may not escape through the catheter. Lint and light dressings are applied, and a bandage round the abdomen. Great care is to be taken to keep the catheter pervious, and, usually on the third day, the slip of linen may be taken out, and the wound closed with adhesive plaster. (See *Carpue's History of the High Operation, p.* 171, 172.)

Sir Everard Home made trial of Dr. Souberbielle's method in St. George's Hospital, and though some difficulty and delay occurred in the operation, on account of the stone being encysted, the result was successful. Subsequently to this case, however, Sir Everard has invented and practised another method, which, as far as I can judge, is better than that of Côme, or Souberbielle, though its principles are the same. When it is considered, that in the operation of these last lithotomists, the neck of the bladder is not opened, and the catheter enters that receptacle through the prostatic portion of the urethra, it must be immediately obvious, that the incision in the perinæum cannot answer any material object, because a tube may be placed in the same position by passing it through the urethra from the orifice in the glans. The retainer, or bracelet, invented for keeping the catheter in the bladder, in cases of enlargement of the prostate gland, seemed to Sir Everard Home peculiarly applicable to the high operation, since it keeps the tube steadily in the natural canal, and renders the wound in the perinæum unnecessary. Bracelets, for this purpose, extremely elastic, and producing no irritation, are sold by Mr. Weiss, of the Strand. They are furnished with small rings, to which the outer end of the catheter is fixed by means of string.

Sir Everard Home performed his new operation, for the first time, in St. George's Hospital, on the 26th of May, 1820. An incision was made in the direction of the linea alba, between the pyramidales muscles, beginning at the pubes, and extending four inches in length: it was continued down to the tendon. The linea alba was then pierced close to the pubes, and divided by a probe-pointed bistoury to the extent of three inches. The pyramidales muscles had a portion of their origin at the symphysis pubis detached to make room. When the finger was passed down under the linea alba, the fundus of the bladder was felt covered with loose, fatty, cellular membrane. A silver catheter, open at the end, was now passed along the urethra into the bladder, and when the point was felt by the finger in the wound, pressing up the fundus, a stilet, that had been concealed, was forced through the coats of the bladder, and followed by the end of the catheter. The stilet was then withdrawn, and the opening, through the fundus of the bladder, enlarged towards the pubes, by a probe-pointed bistoury, sufficiently to admit two fingers, and then the catheter was withdrawn. The fundus of the bladder was held up by one finger, and the stone examined by the forefinger of the right hand. A pair of forceps, with a net attached, was passed down into the bladder, and the stone directed into it by the finger: the surface being very rough, the stone stuck upon the opening of the forceps, and being retained there by the finger, was extracted. A slip of linen had one end introduced into the bladder, and the other was left hanging out of the wound, the edges of which were brought together by adhesive plaster. A flexible gum catheter, without the stilet, was passed into the bladder by the urethra, and kept there by an elastic retainer surrounding the penis. The patient was put to bed, and laid upon his side, in which position the urine escaped freely through the catheter." As no blood had been lost in the operation, twelve ounces were taken from the arm. The next day the slip of linen was withdrawn, as useless and irritating, the catheter, while pervious, preventing any urine from escaping by the wound. Sir Everard thinks, that in future the linen need only be left in the external wound, so as to prevent collections of matter, and carry off any urine, which may issue from the opening in the bladder, when the catheter happens to be stopped up. For this operation, Sir Everard particularly recommends catheters, with their insides polished like their outsides, in order that they may better resist the effects of the urine. Suffice it to add, with respect to the above case, that the boy soon recovered, the bladder having resumed its healthy functions in ten days, although the calculus was of the roughest possible kind.

Sir Everard Home has repeated his new method on a gentleman, who went out in his carriage, with the external wound completely healed, on the 14th day after the operation. The only particulars, which need here be noticed, in regard to the latter case, are, that some difficulty was experienced in bringing the point of the catheter forwards toward the pubes, and the slit in the front of the instrument made it so incapable of bearing lateral motion, that the two sides were twisted over one another. (*On Strictures, Vol.* 3, *p.* 359, *8vo. Lond.* 1820.)

Whoever follows this method of operating should always be provided with several tubes and stilets, of different lengths and curvatures; for, in the only case, in which I have seen the operation attempted, the extremity of the catheter could not be made to project the fundus of the bladder towards the pubes, and, after long-protracted endeavours had been made to bring the end of the instrument upwards and forwards, the tube broke, and the operation was left unfinished. The impression upon my mind was, that no resistance of the bladder could account for what happened, and that the fault lay in the instrument itself, which should have been exchanged for another of more suitable form, as soon as it was found to be inapplicable. And, I believe, that if attention be paid to this suggestion of always having at hand a sufficient number of tubes and stilets of different lengths and curvatures, Sir Everard Home's new method will be the best modification of the high operation yet proposed. The slip of linen, however, I think is more likely to do harm by its irritation, than any good, as a conductor of the urine or matter out the wound. At all events, as Sir Everard has observed, it should never be passed into the bladder itself. Whenever I am asked my opinion, respecting the preference, which should be given to the high operation, as a general practice, I venture no further than to express a favourable opinion of it for cases, in which the calculus is known beforehand to be of very large size, or the urethra and prostate gland are diseased. The reasons urged by Mr. Carpue, in favour of a preference to the high operation in most cases, are: 1. Because, it is generally performed in less time; a point, which may be disputed, though it is perhaps not worth contesting, since the danger of an operation cannot always be truly estimated by the length of time, which the patient remains in the operating room, slow and gentle proceedings sometimes contributing to his safety. 2. There is less pain; a remark, the justness of which must depend, perhaps, upon the manner in which each operation is done. 3. There is no fear of a fatal hemorrhage; a consideration, which I admit is one good reason in favour of the high operation; though the lateral operation is only subject to risk of hemorrhage, when the incisions are directed in a manner not sanctioned in this dictionary. 4. There is no division of the prostate and inferior part of the bladder: no, but there is one of the fundus, so that perhaps on this point the two operations stand upon an equality, As for there being no danger in the high operation of wounding the rectum, it is undoubtedly an advantage, though the accident, as far as I have seen, is not followed by any serious consequences, and can only happen from inattention to rules easily followed. 5. The stone, if of a certain size, cannot be extracted by the lateral operation, but admits of being so by the high operation. Of all the reasons for the latter practice, this appears to me the strongest, with the exception perhaps of disease in the urethra and prostate. 6. A small stone is more readily discovered in this method, than in the lateral operation: a point which I consider questionable, and at all events, not sufficiently important to form a ground for the high operation. 7. If a stone breaks, the particles can be extracted with more certainty, than in the lateral operation: on this question authors differ. 8. The high operation enables the surgeon to remove encysted calculi with greater ease: a reason which may perhaps be generally true, but which is somewhat weakened by the consideration that encysted calculi are not very frequent. Mr. Carpue allows, that the high operation should not be selected when the patient is corpulent, and the bladder is thickened and diseased, so that its fundus cannot be raised above the pubes. (See *Hist. of the High Operation*, p. 173, 8vo. *Lond.* 1819.)

As it is not my object to discourage the practice of the high operation, *under the particular circumstances* which have been specified, I decline entering into any strict consideration of the inconveniences to which this method is exclusively subject, especially, the greater vicinity of the wound to the peritoneum and small intestines, and the division of that membrane and protrusion of the viscera; accidents, which will be found by any body, who chooses to look over the cases on record, not to have been unfrequent. On the contrary, as I believe this method is advantageous in certain cases, the recent attempts to bring it to greater perfection give me sincere pleasure.

In December, 1818, Mr. Kirby, of Dublin, performed the high operation for the extraction of an elastic gum catheter, which had slipped into the bladder through the cannula of a trocar, with which paracentesis had been performed. No contrivance was found necessary for lifting up the fundus of the bladder. The puncture, already made, was enlarged, and after the operation was finished, a catheter was placed in the wound, but was withdrawn on the 4th day, as the urine passed out by the side of it. The case terminated well. (See *Kirby's Cases, p. 92, &c.* 8vo. *Dublin*, 1819.)

LATERAL OPERATION.

So named from the prostate gland, and neck of the bladder, being laterally cut.

From some quotations made by Mr. Carpue from the works of Franco, it appears clear enough, that the latter was not only the inventor of the lateral operation, but that he placed his patients in the position adopted at the present time, used similar instruments to those now employed, (excepting that his gorget had no sharp side) and made the same incisions. Now, as this claim of Franco to an invention of such importance had been nearly, or quite forgot, when Mr. Carpue's work made its appearance, the latter gentleman deserves much praise for reminding the profession of what may be due to the memory of an old surgeon, whose name must flourish, as long as the history of the rise and progress of surgery is interesting to mankind. But, though Franco appears probably to have practised the lateral operation, or something very much like it, he never established the method as a permanent improvement of surgery, which measure was left to be completed long afterward by an ecclesiastic, who called himself Frère Jacques: he came to Paris in 1697, bringing with him abundance of certificates of his dexterity in operating; and making his history known to the court and magistrates of the city, he got an order to cut at the Hôtel Dieu, and the Charité, where he performed this operation on about fifty persons. His success did not answer the promises which he had made, and from that time his reputation seems to have declined in the world, if we may give credit to Dionis, who has furnished us with these particulars.—(*Sharp's Operations.*)

Frère Jacques used a large round staff without a groove, and when it was introduced into the bladder, he depressed its handle, with an intention of making the portion of this viscus, which he wished to cut, approach the perinæum. He then plunged a long dagger-shaped knife into the left hip, near the tuber ischii, two finger-breadths from the perinæum, and pushing it towards the bladder, opened it in its body, or as near the neck as he could, directing his incision upward from the anus. He never withdrew his knife, till a sufficient opening had been made for the extraction of the stone. Sometimes he used a conductor to guide the forceps, but more commonly directed them with his finger, which he passed into the wound after withdrawing the knife. When he had hold of the stone, he used to draw it out in a quick rough manner, heedless of the bad consequences. His only object was to get the stone extracted, and he disregarded every thing else; all preparatory means, all dressings, all after-treatment. (*Allan, p.* 23.)

Totally ignorant of anatomy, and thus rude and indiscriminate in practice, Frère Jacques soon sunk into disrepute. However, there were several eminent surgeons, who conceived, from considering the parts which he cut, that his method might be converted into a most useful operation. (*Sharp's Operations.*)

The principal defect in his first manner of cutting, was the want of a groove in his staff, which made it difficult to carry the knife into the bladder. At length, Frère Jacques was prevailed upon to study anatomy, by which his judgment being improved, he readily embraced several improvements, which were suggested to him. Indeed, we are informed that he now succeeded better, and knew more, than is generally imagined. Mr. Sharp says, that when he himself was in France in 1702, he saw a pamphlet, published by this celebrated character, in which his method of operating appeared so much improved, that it scarcely differed from the practice of that time. Frère Jacques had learnt the necessity of dressing the wound after the operation, and had profited so much from the criticisms of Mery, Fagon, Felix, and Hunauld, that he then used a staff with a groove, and what is more extraordinary, had cut thirty-eight patients successively, without losing one. (*Sharp's Operations.*)

In short, as a modern writer has observed, he lost fewer patients than we do at the present day, in operating with a gorget. He is said to have cut nearly 5000 patients in the course of his life, and though persecuted by the regular lithotomists, he was imitated by Marechal at Paris, Raw in Holland, and by Bamber and Cheselden in England, where his operation was perfected. (*Allan.*)

For a particular history of Frère Jacques, and his operations, Allan refers us to *Bussiere's Letter to Sir Hans Sloane, Philos. Trans.* 1699. *Observations sur la Manière de tailler dans les deux Sexes, pour l'Extraction de la Pierre, pratiquée par F. Jacques, par J. Mery. Lister's Journey to Paris in* 1698. *Cours d'Operations de Chirurgie, par Dionis. Garengeot Traité des Operations, T.* 3, *Morand, Opusculé Chirurgie, Part* 2.

Among the many who saw Frère Jacques operate, was the famous Professor Raw, who carried his method into Holland, and practised it with amazing success. He never published any account of it himself, though he admitted several to his operations; but after his death, his successor Albinus, gave the world a very circumstantial detail of all the processes, and mentions, as one of Raw's improvements, that he used to open the bladder, between its neck and the ureter. But either Albinus, in his relation, or Raw himself in his supposition, was mistaken; since it is almost impossible to cut the bladder in that part upon the common staff without also wounding the neck." (*Sharp in Operations and Critical Inquiry.*)

Raw's method was objectionable, even when accomplished, as the urine could not readily escape, and became extravasated around the rectum, so as to produce terrible mischief. There is little doubt, that Raw's really successful plan was only imitative of Frère Jacques's second improved one, though he was not honourable enough to confess it. (See *Ferhius de Calculo Vesicæ.*)

Dr. Bamber was the first man in England, who made a trial of Raw's method on the living subject, which he did in St. Bartholomew's Hospital. Cheselden, who had been in the habit of practising the high operation, gladly abandoned it, on receiving the account of Raw's plan and success, and a few days after Bamber, he began to cut in this way in St. Thomas's Hospital.

Cheselden used at first to operate in the following manner. The patient being placed, and tied much in the same way, as is done at this day, the operator introduces a hollow grooved steel catheter into the bladder, and with a syringe, mounted with an ox's ureter, injects as much warm water into it, as the patient can bear without pain. The water being kept from running out by a slip of flannel tied round the penis, the end of the catheter is to be held by an assistant, whose principal care is to keep it from rising, but not at all to direct the groove to the place where the incision is to be made.

With a pointed convex-edged knife, the

operator beginning about an inch above the anus, on the left side of the raphe, between the accelerator urinæ, and erector penis, makes an incision downwards, by the side of the sphincter ani, a little obliquely outwards as it descends, from two and a half to four inches in length, according to the age of the patient, or size and structure of the parts. This incision he endeavours to make all at one stroke, so as to cut through the skin, fat, and all, or part of the levator ani, which lies in his way. This done, he passes his left fore-finger into the middle of the wound, in order to press the rectum to one side, that it may be in less danger of being cut; and taking a crooked knife in his other hand, with the edge on the concave side, he thrusts the point of it through the wound, close by his finger, into the bladder, between the vesicula seminalis and os ischium of the same side. This second incision is continued upwards, till the point of the knife comes out at the upper part of the first. The incision being completed, the operator passes his left fore-finger through the wound into the bladder, and having felt, and secured the stone, he introduces the forceps, pulls out his finger, and extracts the stone.

As the bladder was distended, Cheselden thought it unnecessary to cut on the groove of the staff, and that, as this viscus was sufficiently pressed down by the instrument, the forceps could be very well introduced without the use of any director, except the finger. (*Postscript to Douglas's History of the Lateral Operation*, 1726.)

With respect to this first of Cheselden's plans, Sharp says, the operations were exceedingly dexterous; but the wound of the bladder retiring back, when it was empty, did not leave a ready issue for the urine, which insinuated itself among the neighbouring muscles and cellular substance, and four out of the ten patients on whom the operation was done perished, and some of the others narrowly escaped. (*Sharp's Operations.*)

Cheselden, finding that he lost so many patients in imitating Raw, according to the directions given by Albinus, began a new manner of operating, which he thus describes: "I first make as long an incision as I well can, beginning near the place where the old operation ends, and cutting down between the musculus accelerator urinæ and erector penis, and by the side of the intestinum rectum: I then feel for the staff, and cut upon it the length of the prostate gland straight on to the bladder, holding down the gut all the while with one or two fingers of my left hand." (*Anatomy of the Human Body, Edit.* 1730.)

It deserves remark, that it was Cheselden's second manner of cutting, which was described in the *Opuscules de Chirurgie*, of Morand, who was deputed, and had his expenses defrayed by the Royal Academy of Sciences in Paris, to come over to England, and learn from Mr. Cheselden himself, his way of operating for the stone; and, accordingly, we find, that most French authors, taking their account from Morand, describe Cheselden's second, not his third operation, as that which he invented, and bears his name. But, that Mr. Cheselden never resumed his second manner of cutting may be inferred from his continuing to describe the third only in all the editions of his anatomy published after 1730. (*See a note by J. Thomson, M. D. annexed to his new edition of Douglas's Appendix. Edinb.* 1808.)

The instruments which Cheselden employed in his third, and most improved mode of cutting for the stone, were a staff, an incision knife, a gorget, a pair of forceps, and a crooked needle carrying a waxed thread. The patient being placed on a table, his wrists are brought down to the outsides of his ankles, and secured there by proper bandages, his knees having first been bent, and his heels brought back near his buttocks.

Cheselden used then to take a catheter, first dipped in oil, and introduce it into the bladder, where having searched for, and discovered the stone, he gave the instrument to one of his colleagues, whom he desired to satisfy himself, whether there was a stone, or not. The assistant, standing on his right hand, held the handle of the staff between his fingers and thumb, inclined it a little towards the patient's right thigh, and drew the concave side close up to the os pubis, in order to remove the urethra as far as possible from the rectum.

The groove of the staff being thus turned outwardly and laterally, Cheselden sat down in a low chair, and keeping the skin of the perinæum steady with the thumb and fore-finger of his left hand, he made the first or outward incision, through the integuments, from above downwards, beginning on the left side of the raphe, between the scrotum and verge of the anus, almost as high up as where the skin of the perinæum begins to form the bag containing the testicles. Thence he continued the wound obliquely outwards, as low down as the middle of the margin of the anus, at about half an inch distant from it, and consequently, beyond the tuberosity of the ischium. He was always careful to make this outward wound as large as he could with safety. Having cut the fat rather deeply, especially near the rectum, he used to put his left fore-finger into the wound, and keep it there till the internal incision was quite finished; first to direct the point of his knife into the groove of the staff, which he now felt with the end of his finger; and secondly, to hold and prevent the rectum from being wounded, by the side of which his knife was to pass. This inward incision Cheselden made with more caution, than the former. His knife first entered the groove of the rostrated, or straight part of the staff, through the side of the bladder, immediately above the prostate, and its point was afterward brought along the same groove in the direction downwards, and forwards, or towards himself. Cheselden thus divided that part of the sphincter of the bladder, which lay upon the prostate gland, of which he next cut the outside of one half obliquely, according to the direction and whole length of the urethra within it, and finished the internal incision, by dividing the membranous portion of the urethra, on the convex part of his staff.

A sufficient opening being made, Cheselden used to rise from his chair, his finger still remaining in the wound. Next he put the beak of his gorget in the groove of the staff, and then thrust it into the bladder. The staff was now withdrawn, and while he held the gorget with his left hand, he introduced the forceps with the flat side uppermost, with great caution along the concavity of the gorget. When the forceps was in the bladder, he withdrew the gorget, and taking hold of the two handles of the forceps with both his hands, he searched gently for the stone, while the blades were still kept shut. As soon as the calculus was felt, the forceps was opened, and an attempt made to get the lower blade under the stone, in order that it might be more conveniently laid hold of. This being done, the stone was extracted with a very slow motion, in order to give the parts time to dilate, and the forceps was gently turned in all directions.

When the stone was very small, and did not lie well in the forceps, Cheselden used to withdraw this instrument, and introduce his finger into the bladder, for the purpose of turning the stone, and disengaging it from the folds of the lining of the bladder, in which it was sometimes entangled. Then the gorget was passed in again on the upper side of his finger, and turned as soon as the latter was pulled out. Lastly; the forceps was introduced, and the stone extracted. With the view of hindering a soft stone from breaking during its extraction, Cheselden used to put one or more of his fingers between the branches of his forceps, so as to prevent any greater pressure upon it, than what was just necessary to hold it together. But when it did break, or there were more calculi than one, he used to extract the single stones, or fragments, one after another, repeating the introduction of his fingers and forceps, as often as there was occasion. Cheselden took care not to thrust the forceps so far into the bladder as to bruise or wound its opposite side; and he was equally careful not to pinch any folds of its inner coat. In this way, Cheselden saved 50 patients out of 52, whom he cut successively in St. Thomas's Hospital. (*Appendix to the History of the Lateral Operation, by J. Douglas.* 1731.)

Cheselden, with all the enthusiasm of an inventor, believed, that he had discovered an operation, which was not susceptible of improvement; yet, he himself changed the manner of his incision not less than three times, in the course of a few years. 1st, He cut into the body of the bladder, behind the prostate, when he imitated Raw. 2dly, He cut another part of the bladder, viz. the neck and the thick substance of the prostate; this is his lateral mode of incision. 3dly, He changed a third time, not the essential form of the incision, but the direction, in which he moved the knife; for in his first operation, when imitating the supposed operation of Raw and Frère Jacques, he struck his knife into the body of the bladder, betwixt the tuber ischii and the vesiculæ seminales, and all his incision lay behind the prostate gland. In this second operation, he pushed his knife into the membranous part of the urethra, immediately behind the bulb, and ran it down through the substance of the gland; but his incision stopped at the membranous part, or body, of the bladder. But in his third operation, after very large external incisions, he passed his knife deeply into the great hollow under the tuber ischii, entered it into the body of the bladder immediately behind the gland, and drawing it towards himself, cut through the whole substance of the gland, and even a part of the urethra, "cutting the same parts the contrary way." By carrying the fore-finger of the left hand before the knife, in dissecting towards the body of the bladder, he protected the rectum more perfectly, than he could do in running the knife backwards along the groove of the staff; and by striking his knife into the body of the bladder and drawing it towards him, through the whole thickness of the gland, he was sure to make an ample wound. (*J. Bell's Principles of Surgery, Vol. 2, Part 1, p. 152.*)

LATERAL OPERATION AS PERFORMED AT THE PRESENT DAY WITH CUTTING GORGETS.

The gorget has the same kind of form as one of the instruments used by F. Colot and others in the performance of the apparatus major, and the common opinion, that the conductor of Hildanus was the first model of it, is not exactly true; but it differs from the instruments employed by these older surgeons in having a cutting edge. Sir Cesar Hawkins thought that, when its right side was sharpened into a cutting edge, it might be safely pushed into the bladder, guided by the staff, so as to make the true lateral incision in the left side of the prostate gland more easily, and with less risk of injuring the adjacent parts, than Cheselden could do with the knife; and surgeons were pleased with a contrivance, which saved them from the responsibility of dissecting parts, with the anatomy of which all were not equally well acquainted. (*J. Bell. Allan.*)

As Scarpa observes: To render the execution of the lateral operation easier to surgeons of less experience than Cheselden, was the motive which induced Hawkins to propose his gorget. He thought, that two great advantages would be gained by the use of this instrument; one of executing invariably the lateral incision of Cheselden; the other, of constantly guarding the patient through the whole course of the operation, from injury of the rectum, and of the arteria pudica profunda. The utility of the latter object (says Scarpa) cannot be disputed, as it is evident, that *the convexity of the director of the instrument defends the rectum from injury*, and that *its cutting edge not being inclined horizontally,* *towards the tuberosity and ramus of the ischium, but turned upwards in the direction of the longitudinal axis of the neck of the urethra, cannot wound the pudic artery.* But, with respect to the first advantage, or that of executing precisely the lateral incision of Cheselden, it must be admitted that it does not completely fulfil the intention which he proposed, not only on account of the cutting edge of his instrument not being raised enough above the level of the staff, to penetrate sufficiently the substance of the prostate gland, and consequently to divide it to a proper depth; but, because being too much turned upwards at that part of it, which is to lay open the base of the prostate gland, it does not divide it laterally, but rather at its upper part, towards the summit of the ramus of the ischium, and the arch of the pubes; an opening, of all others in the perinæum, the most confined, and presenting the greatest impediment to the passage of the stone from the bladder. The breadth of the point of the director is, besides, so disproportionate to the diameter of the membranous part of the urethra, that, from the great resistance with which it meets, the instrument may easily slip from the groove of the staff, and pass between the bladder and rectum, *a serious accident, which has very often happened even in the hands of experienced surgeons.*

Scarpa considers all the modifications of Hawkins's gorget, proposed by B. Bell, Desault, Cline, and Cruikshanks, as deteriorations of the original instrument. B. Bell (he observes) has diminished the breadth of the director, but has given the cutting edge an horizontal direction. The horizontal direction of the cutting edge is also preferred by Desault, Cline, and Cruikshanks; but they have enlarged the director, and flattened the part which was previously concave. Aware of the danger of wounding the pudic artery, by the horizontal direction of the gorget, they direct the handle of the staff to be inclined towards the patient's right groin, and the gorget to be pushed along it, inclined in such a manner, that its obtuse edge may be directed towards the rectum, and its cutting edge placed at a sufficient distance from the tuberosity and ramus of the ischium to avoid wounding the artery. Scarpa contends, however, that it is difficult to give a proper degree of obliquity to the staff, and that such inclination of the instrument must be incommodious, arbitrary, and unstable, in comparison with that position of it, in which the handle of the staff is held in a line perpendicular to the body of the patient, and its concavity placed against the arch of the pubes; on which stability of the instrument (says Scarpa) the safety and precision of the lateral operation depend. According to this eminent professor, the defects of Hawkins's original gorget arise from the excessive breadth of the director, particularly at the point; the want of sufficient elevation of the cutting edge, above the level of the groove of the staff, and the uncertain inclination of the edge to the axis of the urethra and prostate gland. The cervix of the urethra, in a man between thirty and forty years of age, is only three lines in diameter at the apex of the prostate gland, four lines in its centre, and five near the orifice of the bladder. The apex of the prostate gland is rather more than two lines in thickness, the body or centre four, and the base six, and sometimes eight, which surrounds the orifice of the bladder. In an adult of middle stature, from eighteen to twenty years of age, the thickness of the base of the prostate gland is about two lines less, compared with that of a man of forty, and of a large size. The precise line in which the lateral incision of the prostate gland should be made in an adult, (says Scarpa) is found to be inclined to the longitudinal axis of the cervix of the urethra, and of the gland itself, at an angle of 69°. Now, from these data, drawn from the structure of the parts, Scarpa makes the director of his gorget only four lines broad, and two deep; the breadth decreasing at the beak. The cutting edge of the instrument is straight near its point, but gradually rises, and becomes convex above the level of the staff, so that its greatest convexity is seven lines broad. Lastly; the inclination of the cutting edge to the longitudinal axis of the director, is exactly at an angle of 69°; that is to say, the same as the left side of the prostate gland to the longitudinal axis of the neck of the urethra. (See *Scarpa's Memoir on Hawkins's Gorget; transl. by Mr. Briggs, p.* 12, 17.)

For nearly twenty years past, the instrument-makers in London have been in the habit of selling a gorget, which Mr. Abernethy first had constructed, and which in the particularity of having its cutting edge turned up at an angle of 45°, bears much analogy to the instrument lately recommended by Scarpa. The cutting edge is straight, and that useless and dangerous part of a gorget, sometimes called the shoulder, is removed. Admitting that the principles of the lateral operation as inculcated by Scarpa, are correct, and of which I shall presently speak, it appears to me, that Mr. Abernethy's gorget is far preferable to that very recently proposed by Scarpa. Its edge is not so immoderately turned up, and it will enter with more ease, and less risk of slipping from from the staff, because it has not any projecting shoulder, which, while the staff is firmly held with the beak of the gorget in it, can have no other effect but that of obstructing the passage of the last instrument.

Gorgets, which cut on both sides, have also been sometimes employed in England, and as a larger opening can be obtained by them, even without trespassing the limits of the incision, fixed by Scarpa, that is to say, without cutting any part of the body of the bladder, they appear to promise utility, especially when the stone is suspected to be large. However, they are less used now, than they were some years ago, when Sir Astley Cooper employed them in Guy's Hospital; but I am unacquainted with the particular reasons of this change.

Some criticisms on Scarpa's method of operating, and a few remarks on the size and direction of the lateral incision, will be found in a subsequent section of the present article.

As inflammation of the bladder and peritonæum is the principal danger of this operation, and, under an equal degree of injury and violence, is most likely to happen in a plethoric subject, it has been a question, whether venesection should not be practised a day or two before the patient is operated upon, supposing that his age and weakness form no prohibition. The chief reason, which prevents the common observance of this practice is, that a great deal of blood is sometimes lost in the operation itself. But when this has not happened, and the patient is young and strong, and particularly when the operation has been tedious, and the bladder has suffered a good deal, I am disposed to think very favourable of the rule, which is followed by many surgeons, of bleeding the patient as soon as he is put to bed, and recovered from the first depressing effects of the operation. An opening medicine should also be given the day before the patient is cut, and a clyster injected a couple of hours before the time fixed upon for the operation, in order to empty the rectum, and thus diminish the chance of its being wounded.

As it is advantageous to have the bladder somewhat distended, the patient should be requested to retain his urine a certain time before being cut. Formerly, a jugum penis was sometimes used for confining the urine in the bladder; but, since my entrance into the profession, I have never heard of this contrivance being employed.

Before the operation, the following instruments should all be arranged ready on a table: a staff of as large a diameter as will easily admit of introduction, and the groove of which is very deep, and closed at the extremity. A sharp gorget, with a beak nicely and accurately adapted to the deep groove of the preceding instrument, so as to glide easily and securely. A large scalpel for making the first incisions. Forceps of various sizes, for extracting the stone. A blunt-pointed curved bistoury for enlarging the wound in the prostate, if the incision of the gorget be not sufficiently large, as the parts should never be lacerated. A pair of Le Cat's forceps with teeth for breaking the stone, if too large to come through any wound reasonably dilated. A syringe for washing out clots of blood, or particles of the stone. A scoop for the removal of small calculi or fragments. Two strong garters, or bands, with which the patient's hands and feet are tied together.

The curvature of the staff is a matter of considerable importance; because the direction of the incision through the prostate gland and neck of the bladder is partly determined by it. The French surgeons, convinced of the advantage of introducing the gorget in the direction of the axis of the bladder, always use a staff, which is much more curved than what English surgeons employ. (See *Roux, Voyage fait à Londres en 1814, ou Parallèle de la Chir. Angloise, &c. p.* 319.) But, I am inclined to believe with Scarpa, that, upon the whole, it is best to let the curvature of the staff correspond exactly to that of the axis of the neck of the urethra and prostate gland. (*Memoir on Hawkins's Gorget, &c. p.* 17.)

After introducing the staff, and feeling that the stone is certainly in the bladder, the patient is to be secured in the same position, as was described in the account of Cheselden's latest method of operating.

The assistant, holding up the scrotum with his left hand, is with his right to hold the staff, inclining its handle towards the right groin, so as to make the grooved convexity of the instrument turn towards the left side of the perinæum. Some operators, also, like the assistant to depress the handle of the staff towards the patient's abdomen, in order to make its convexity project in the perinæum, while others condemn this plan, asserting, that it withdraws the instrument from the bladder. (*Allan, &c.*)

Professor Scarpa disapproves of inclining the handle of the staff towards the patient's right groin, (*p.* 15.) and he expressly recommends this instrument to be held firmly against the arch of the pubes, in a line perpendicular to the body of the patient, so that the convex part of the director may be placed towards the rectum, and take the exact course of the axis of the neck of the urethra and prostate gland. (*P.* 20.) This position of the staff is the firmest and most commodious to the surgeon, and Scarpa maintains, that on such stability of the instrument the safety and precision of the lateral operation depend. (*P.* 15.)

The first incision should always commence below the bulb of the urethra, over the membranous part of this canal, at the place, where the operator means to make his first cut into the groove of the staff, and the cut should extend at least three inches, obliquely downward, to the left of the raphe of the perinæum, at equal distance from the tuberosity of the ischium and the anus. In a large man, the first cut should pass the anus an inch and a half or more; for it is a general rule in surgery to make free external incisions, by which the surgeon is enabled to conduct the remaining steps of his operation with greater facility, and nowhere is it so necessary, as where a stone is to be extracted. (*Allan.*) That excellent surgical writer, Callisen, lays it down as a rule to be observed in the lateral operation, *that the incision ought not to extend to such parts as can make no impediment to the extraction of the stone; and therefore,* (says he) *the bulb, and that part of the urethra, which is surrounded by the corpus spongiosum, should never be cut.* Only those parts ought to be divided, which firmly resist the safe introduction of instruments into the bladder, and the extraction of the stone. Hence, the integuments must be opened by an ample incision, and the membranous part of the urethra, transversales perinæi muscles, levater ani, and prostate gland, be properly divided. (*Callisen, Systema Chirurgiæ Hodiernæ, Pars* 2, *p.* 655.) Like Scarpa, however, he is fearful of making a free cut through the neck of the bladder, and in lieu of doing so, prefers a slow and cautious dilatation of the parts. When the external cut through the integuments has been executed, the next object is to divide the transversales perinæi muscles, which stand, like a bar, across the triangular hollow, out of which alone the stone can be easily extracted. A part of the membranous portion of the urethra, adjoining the prostate gland, is next to be laid open; but an extensive cut through it, as far forward as the bulb, is quite unnecessary; because it will not at all facilitate the passage of the stone outward.

Having placed the beak of the gorget in the groove of the staff, the operator takes firm hold of the latter instrument with his left hand, raises its handle from the abdomen, so that it may form nearly a right angle with the body, and stands up. Before attempting to push the gorget into the bladder, however, he should slide it backwards and forwards, with a wriggling motion, that he may first be sure of its beak being in the groove of the staff. The bringing forward of the handle of the latter instrument, so as to elevate its point, before introducing the gorget into the bladder, is also considered of great importance: for it is by this means, that the gorget is introduced along the groove of the staff in the axis of the bladder, the only direction unattended with risk of wounding the rectum. In fact, the gorget should be introduced nearly in a direction, corresponding to a line drawn from the os coccygis to the umbilicus. It is obvious, however, that the degree in which the handle of the staff should be depressed, must depend very much upon the curvature of the instrument.

The utmost attention to the rule last noticed is especially necessary, when a staff with a groove not closed at the end is employed. The neglect of it in this case might make the operator cut the bladder with the gorget in several places, as has actually happened, as we learn from the observations of Mr. B. Bell. But since the gorget, when introduced as nearly as possible in the axis of the bladder, may transfix and otherwise injure this organ, if introduced either too far, or at all beyond the extremity of the staff, I am decidedly of opinion that every surgeon, who chooses to perform the lateral operation with a gorget, should employ a staff, the groove of which is closed at the extremity, as is invariably done in France, and is expressly enjoined by Professor Scarpa. (See *Sabatier's Médecine Opératoire, T.* 3, *p.* 223, *Edit.* 2; *and Scarpa's Memoir on Hawkins's Gorget, p.* 18, *&c.*) There can also be no doubt of the prudence of endeavouring to have only a fixed and limited length of the staff in the bladder. Scarpa specifies an inch and a half as the proper distance to which the end of the staff should enter the bladder. However, as it is known, that this distinguished Professor is an advocate for a very limited incision, and that consequently, he would not require the staff to extend further than an inch and a half into the bladder, I infer that operators, who prefer making a freer opening, must use a staff that reaches into this viscus rather further. Much, however, will depend upon the kind of gorget employed, particularly its breadth.

As soon as the gorget is introduced, the staff is to be withdrawn. Some operators next pass the forceps along the concave surface of the gorget into the bladder; while others, with every appearance of being right, recommend the cutting gorget to be withdrawn immediately it has completed the wound; for then the bladder contracts, and its fundus is liable to be cut. The gorget should be withdrawn in the same line in which it entered, pressing it towards the right side, in order to prevent its making a second wound. If, however, the operator should prefer passing the forceps into the bladder, along the gorget, the latter instrument must be kept quite motionless, lest its sharp edge do mischief; and, at all events, as soon as the forceps is in the bladder, the cutting gorget is to be withdrawn.

Some operators withdraw the cutting gorget, and introduce a blunt one for the guidance of the forceps; a step certainly unnecessary, as the latter instrument will easily pass, when the incision into the bladder is ample and direct, as it ought always to be.

The operator has next to grasp the stone with the blades of the forceps; for which purpose, he is not to expand the instrument as soon as it has arrived in the bladder; but he should first make use of the instrument as a kind of probe, for ascertaining the exact situation of the stone. If this body should be lodged at the lower part of the bladder, just behind its neck, the operator is to open the forceps immediately over the stone, and after depressing the blades a little, is gently to shut them, so as to grasp it. Certainly it is much more scientific to use the forceps at first, merely for ascertaining the position of the stone: for when this is known, the surgeon is much more able to grasp the extraneous body in a skilful manner, than if he were to open the blades of the instrument immediately, without knowing where they ought next to be placed, or when shut. No man of experience can doubt that the injury, which the bladder frequently suffers from rough, reiterated, awkward movements of the forceps, is not an uncommon cause of such inflammation of this viscus, as too often extends to the peritonæum, and occasions death.

If the surgeon cannot readily take hold of the stone with the forceps, he should introduce his fore and middle fingers into the rectum, and raise up the extraneous body, when it may generally be easily grasped. The stone should be held with sufficient firmness to keep it from slipping away from the blades, but not so forcibly as to incur the risk of its breaking.

Sometimes the extraction of the stone is attended with difficulty, owing to the operator having chanced to grasp it in a transverse position, in which circumstance, it is better to try to change its direction, or let it go altogether, and take hold of it in another manner. When the stone is so large, that it cannot be extracted from the wound without violence and laceration, the surgeon may either break the stone by means of a strong pair of forceps, with teeth constructed for the purpose; or he may enlarge the wound with a probe-pointed crooked bistoury, introduced under the guidance of the fore-finger of the left hand. The latter plan is generally the best of the two; for, breaking the stone is an exceedingly unpleasant circumstance, as it creates serious danger of calculous fragments remaining behind.

However, as nothing can justify the exertion of force in pulling out a stone, if the operator should be afraid of making the wound more ample, (it being already large and direct) he must break the stone as above described. As many of the fragments are then to be extracted with the common lithotomy forceps, as can be taken away in this method, after which the surgeon should introduce his finger, in order to feel whether any pieces of the stone still remain behind. Perhaps some of these may be most conveniently taken out with the scoop; but if they are very small, it is best to inject lukewarm water with moderate force into the wound for the purpose of washing them out.

The surgeon however, cannot be too strongly impressed with the absolute necessity of using the greatest care not to remove the patient from the operating table, while any calculus, or fragment, remains in the bladder. For, the distressing pain of the disorder has been known to recur upon the healing of the wound, and a second operation become necessary. It is a melancholy truth, however, that a fresh calculus may form again in the short space of a few months. I have seen several patients who have been cut for the stone, more than once; and Richerand mentions the case of a surgical instrument maker, resident at the gate of La Charité, in Paris, who has undergone the operation three times in the course of a year and a half, although after each operation several eminent surgeons carefully examined the bladder, and could not find any calculus remaining in it. (See *Nosogr. Chir. T.* 3, *p.* 549, *Edit.* 4.)

The stone should always be attentively examined immediately it is extracted; because its appearance conveys some information, though not positive, concerning the existence of others. If the stone is smooth on one surface, the smoothness is generally found to arise from the friction of other stones still in the bladder; but, when it is uniformly rough, it is a presumptive sign, that there is no other one remaining behind. In every instance, however, the surgeon should gently examine the cavity of the bladder with his fore-finger; for, it would be an inexcusable neglect to put the patient to bed with another stone in his bladder.

After the operation, a simple pledget should be laid on the wound, supported by a T bandage; the patient should lie in bed on his back, with his thighs closed; a piece of oil-cloth, and some folded napkins should be laid under him for the reception of the urine, and, if there be much pain, a large opiate should be administered; but, as the latter medicine is a stimulant, if it can be dispensed with, so much the better.

An occasional embarrassment to lithotomists is the circumstance of stones in the bladder not being always free and detached: some are embraced very tightly by the coats of this viscus; others are partially engaged in the ureters: they are sometimes fixed in the neck of the bladder; and are not unfrequently found lodged in sacculi accidentally formed. These cysts are of different sizes: some are small, and exist in a considerable number; some are deeper, with an orifice smaller than their base. They appear to be formed by a prolongation of the internal coat of the bladder. Other sacculi are occasionally found which seem to be composed of all the tunics of the bladder, and they are sometimes of such magnitude, that the bladder appears as if it were divided into two or more cavities of nearly equal size. Stones, found in these sacculi, sometimes present depressions and irregularities, in which fungi of the bladder have been received. When this happens, a portion of such fungous productions is often extracted with the stone; a circumstance that has deceived some practitioners, and led them to suppose, that the calculi actually adhered to the coat of the bladder. (See *Desault's Parisian Chirurgicale Journal, Vol.* 2, *p.* 386, 387.)

The extraction of encysted stones requires different modes of proceeding from those which have been related. Littre conceived that they might be removed in two ways. When they made only an inconsiderable projection into the bladder, he recommended the introduction of a probe, with which the membrane, covering the calculus, was to be rubbed, a finger being put into the rectum, in order to keep it down, and facilitate the action of the probe in opening the cyst. When the calculi were very prominent, Littre recommended taking hold of them with a pair of forceps, and contusing and breaking the membranous pouch, with the points and asperities upon the inside of the blades of the instrument. He conceived that suppuration would then destroy the internal parietes of the cyst, and that the stone would fall into the bladder, and admit of being easily extracted. As Sabatier observes, it is plain, that this theory, which is founded on the idea entertained by Littre of the manner in which stones become encysted, is totally inadmissible in practice.

Garengeot ventured to pass a bistoury into the bladder for the purpose of disengaging a calculus lodged in a particular cyst at the fundus of this organ, behind the pubes. The knife had some tape twisted round the greatest part of its length, and was introduced under the guidance of the left index finger, which was passed in as far as it could reach. The patient was not more than ten, or eleven years old, and consequently of a size, which favoured the operation. The stone was loosened and taken out, and the child recovered. However, as Sabatier remarks, there are many instances, in which this mode of proceeding cannot be imitated; for, if the calculus should be in a sort of cul-de-sac, as often happens, the entrance of which is narrower than its bottom, and the stone be of considerable size, the incision cannot be made large enough, without risk of cutting through the whole thickness of the bladder, and producing certain death by the effusion of urine in the abdomen.

Other practitioners fancied, that the calculus might be taken hold of with the forceps, and turned about in different directions so as to lacerate its connexions, or even that it might be forcibly extracted, with any serious ill consequences. Houstet mentions, (See *Mem. de l'Acad. de Chir. T.* 2, *p.* 307, *&c. Edit.* 12*mo.*) that Peyronie adopted this method on a patient, thirty-one years of age. The calculus did not resist long, and its surface was found covered with fleshy substances, which formed the adhesions to the bladder. The operation was painful, followed by considerable hemorrhage, tension of the belly, hiccough, cold extremities, and death.

There are some examples, however, in which this bold practice had better success. In 1730, Le Dran extracted from a woman an enormous stone, adherent to that part of the bladder which lies upon the rectum. The irritation of the inequalities of the stone had produced ulceration of the bladder, and fungous growths, which insinuated themselves into the substance of the extraneous body. The adhesions readily yielded, and the excrescences came away with the calculus. Ten days afterward, some thick membranous sloughs were voided. This calculus is engraved in Le Dran's Treatise on the Operations.

Le Dran afterward extracted similar stones, which adhered by a less extensive surface; and he relates an operation done by Maréchal, who, in 1715, extracted with a pair of forceps a stone shaped like a calabash, and having its narrow part surrounded by a fungus. In one case, the position of the calculus led Le Dran to suspect that it was fixed in the extremity of the ureter; he shook it occasionally with a pair of forceps; and, lastly, it fell into the bladder, whence it was extracted without difficulty. It resembled a cucumber in shape, and its large extremity had been lodged in the ureter, from which it could only be gradually removed. Sabatier believes, that a case of this description, which must be very uncommon, is the only one in which there is any prospect of removing an encysted stone with success. In other examples, he conceives, that it is more prudent to leave the stone, and let the wound heal, than expose the patient to an almost certain death by repeated attempts to extract it. (*Médecine Opératoire, T.* 3, *p.* 190, 194, *Edit.* 2.) Desault employed a sort of concealed knife, called a *coupe-bride*, for opening the cavity or cyst; and he has recorded one example, in which he thus successfully extracted from a woman, aged sixty-two, a stone, lodged at the insertion of the ureter into the bladder. The bistoury, used by Garengeot, Desault did not consider a safe instrument, as the stones are round, and the knife may slip and pierce the bladder; an objection to which, he says, the *coupe-bride* is not liable. No injury can be received from its point, as the blade is concealed, nor can any part be divided, except what the surgeon intends. If the incision should not be completed at first, the blade may be withdrawn, the semicircular notch of the instrument pushed more forward, and the incision prosecuted to any extent. This instrument was invented for the express purpose of dividing membranous bands in the rectum; but it was afterward employed with the greatest success for the excision of diseased tonsils and fungous tumours situated in cavities. The blade is so contrived, that when it passes through the semicircular notch, it firmly fixes the parts which are to be divided: a thing that cannot be done either with the scissors or bistoury, as the moveable parts recede, and render the section difficult. (See *Desault's Parisian Chirurgicale Journal, Vol.* 1, *p.* 33, *&c.*)

A stone perfectly encysted would not be expected to produce symptoms equal in severity to those which arise from an extraneous body actually in the cavity of the bladder. And yet, in Houstet's interesting dissertation, several cases are recorded, which prove that encysted stones do sometimes cause the same distressing symptoms which proceed from the presence of a loose calculus in the bladder. Hence, the patients were sounded, and in consequence of the sacs, or pouches, in which the stones lay, not being entirely closed, the calculi were distinctly struck by the instrument, and lithotomy attempted. It deserves particular remark, also, that, in a large proportion of these cases, the pouches, or cysts, were not single, but numerous, occupying different parts of the bladder. In some dissections, referred to by Houstet, cysts of this kind were found, not containing any stones whatever; a circumstance that would rather lead one to suspect, that, in general, the formation of these sacs precedes that of the calculi commonly found in them. (See *Observations sur les Pierres Enkistées et Adhérentes à la Vessie par M. Houstet, in Mém. de l'Acad. de Chir. T.* 2, *p.* 268, *Edit. in* 12*mo.*)

OF SOME PARTICULAR METHODS AND INSTRUMENTS.

M. Foubert, a very eminent surgeon at Paris, devised and practised a plan of his own, which, however, has not been considered by others as worthy of being imitated. The patient having retained his urine, so as to distend his bladder, an assistant, with a convenient bolster, presses the abdomen a little below the navel in such a manner, that, by pushing the bladder forwards, he may make that part of it protuberant which lies between the neck and the ureter. The operator, at the same time, introduces the fore-finger of his left hand up the rectum, and drawing it down towards the right buttock, pushes in a trocar on the left side of the perinæum, near the great tuberosity of the ischium, and about an inch above the anus. Then the trocar is to be carried on parallel to the rectum, exactly between the erector penis and accelerator urinæ muscles, so as to enter the bladder on one side of its neck. As soon as the bladder is wounded, the operator withdraws his fore-finger from the anus.

In the upper part of the cannula of the trocar, there is a groove, the use of which is to allow some urine to escape, immediately the instrument enters the bladder, so that the trocar may not be pushed in any further; but its principal use is for guiding the incision. As soon as the urine began to flow, Foubert, retracting the trocar a little, without drawing it quite out of the cannula, introduced the point of a slender knife into the groove in the cannula; and by the guidance of this groove he ran it onwards into the bladder, and was aware of the knife having actually entered this viscus, by the urine flowing still more freely. Then raising the knife from the groove, he made his incision about an inch and a half in length, through the neck of the bladder, by moving the knife from that point at which it had entered upwards towards the pubes. And finally, by moving the handle more largely than the point of the knife, he opened the outer part of the wound to whatever extent the size of the stone seemed to require, and then, withdrawing the knife, he introduced a blunt gorget to guide the forceps.

An effort was made by Thomas to improve this method; but he failed, and it was never much adopted. The inability of many bladders to bear being distended, is an insuperable objection; for, without this, the trocar is liable to pass between the bladder and rectum, and even through the bladder into the pelvis. (*Mémoires de l'Acad. de Chir.* 663, *Vol.* 1. *Le Dran's Parallèle. Sharp's Critical Inquiry. J. Bell's Principles, Vol.* 2.)

In the year 1748, Frère Come's method of performing the lateral operation began to attract considerable notice. The operation was done with a particular instrument, called the *lithotome caché*, by means of which the prostate gland and neck of the bladder were divided, from within outwards. The *lithotome caché* is entitled to much attention, because it is still generally used in several parts of the continent, and sometimes in this country, especially by the surgeons of the Westminster Hospital. "In France (says M. Roux) if there is any mode of operating more common than others, and preferred by the majority of practitioners, it is that in which the instrument, named the *lithotome caché*, is employed." (See *Parallèle de la Chirurgie Angloise, &c. p.* 318. Frère Come does not ascribe the invention of this instrument to himself; but acknowledges that it resembles the knife for operating upon hernia, said to have been devised by a French surgeon of the name of Bienaise. It consists of a handle and the blade part. The latter is slightly curved, about as thick as a quill, furnished with a beak, and excavated so as to form a sheath for a knife of its own length. By means of a kind of lever, the knife can be made to pass out of the sheath, and the distance to which the blade projects also admits of being regulated with precision. For this purpose, the handle is divided into six sides, numbered 6, 7, 9, 11, 13, and 15, and which, according as they are more or less elevated, allow the lever to be depressed in different degrees, and the knife to move out of its sheath in the same proportion. Thus the surgeon can at his option make an incision through the prostate gland and neck of the bladder of six different lengths.

When the lithotome caché is to be used, the patient must be placed in the same posture as in every other mode of practising the lateral operation; and after a staff has been introduced, an oblique incision is to be made from the raphe of the perinæum, to a point situated rather more towards the anus, than the innermost part of the tuberosity of the ischium. The bulb of the urethra should not be cut, and not too much of the membranous part of the urethra. The fat and transverse muscles having been divided, and the urethra opened, exactly as in the common operation, the scalpel is to be put down, and the beak of the lithotome introduced into the groove of the staff. Of course, the surgeon, previously to the operation, will have settled the distance, to which the blade of the instrument is to pass out of the sheath, and which must necessarily depend upon the age of the subject, and the presumed size of the calculus. When the beak of the lithotome has been inserted in the groove of the staff, the surgeon is to take hold of the handle of the latter instrument with his left hand, and bring it a little towards himself, at the same time pushing the lithotome into the bladder, with the handle depressed as much as possible. The staff is now to be withdrawn, and the surgeon is to try to feel the stone with the sheath of the other instrument, in order to be able to judge of the size of the calculus, and whether the distance, to which the blade of the knife is intended to move out of the sheath, is such as is likely to make an opening of due, but not unnecessary magnitude. Things being properly determined, the lithotome is to be held in a position calculated to make a division of the parts *which is parallel to the cut in the integuments*, and, by means of the lever, the cutting blade of the instrument is then to be disengaged from its sheath. The surgeon is next to draw the opened lithotome towards himself, in a perfectly horizontal manner, so as to make the requisite division of the prostate gland and orifice of the bladder.

As Sabatier observes, Frère Come's method undoubtedly possesses all the advantages of the lateral operation, besides being more easy than Cheselden's plan, and most of the other modes, subsequently proposed, for cutting the neck of the bladder with perfect smoothness, and to a sufficient extent to allow the calculus to be removed, without any laceration of the parts. (*Médecine Opératoire, T. 3, p.* 199.)

There have been several objections urged against the use of the lithotome caché.

1. It is said that the size of the incision is not always proportioned to the distance, to which the knife moves out of the sheath, and that the instrument, when opened to No. 13 or 15, sometimes makes a smaller incision, than when opened only to No. 5 or 7. This uncertainty is said to depend upon the greater or less contraction of the bladder in different subjects.

For my own part, I confess, that I am not inclined to put much credit in the accuracy of this last explanation, and suspect the difference sometimes observed must depend upon the operator not taking care to draw out the instrument in a horizontal direction, a thing which is always easy to be done.

2. Frère Come himself made his incision too high, so that an extravasation of urine in the scrotum followed some of his operations; but the above method of operating is free from any objection of this kind.

3. Some surgical writers have exaggerated the danger of cutting the body of the bladder too extensively with the lithotome, and thus producing internal hemorrhage. However, this cannot happen, unless the surgeon raise the handle of the instrument improperly at the moment of withdrawing it, and as Sabatier himself allows, it is rather the fault of the operator than of the operation.

4. The arteria pudica profunda and the rectum, which some authors conceive to be endangered, must always be in absolute safety, if the edge of the knife of the lithotome be turned in the direction above recommended.

I think that for a surgeon, who understands the right principles of lithotomy, this is one of the best ways of performing the operation.

When I was at Paris in 1815, I saw Dr. Souberbielle operate very skilfully with the lithotome caché. A stone of considerable size was extracted from a gentleman, who was, I should think, not less than 70. No apprehensions were entertained of ill success, as I understood that this operator hardly ever lost a patient.

M. Roux, when he visited England, seems not to have been informed, that at the Westminster Hospital, the lithotome caché has been commonly employed for many years past. It has also been sometimes used at Guy's Hospital by Sir A. Cooper. When M. Roux likewise finds fault with the bad construction of this instrument, as made in London, I suspect, that he cannot have seen those which are made and sold by Mr. Evans. (See *Voyage fait à Londres, ou Parallèle de la Chirurgie Angloise, &c. p.* 318.)

Le Cat, a surgeon of Rouen, in Normandy, devised a mode of lithotomy which would be too absurd to be described, were it less renowned. He thought the neck of the bladder might be dilated, like the wound, and his operation was deformed with all the cruelty of the Marian method, and every error attendant on the infant state of the lateral operation. He first introduced a long wide staff; he cut forward with a common scalpel, through the skin and fat, till he could distinguish the bulb, the naked urethra, and the prostate gland. Secondly, with another knife, the urethrotome, having a groove on one side, he opened the urethra, just before the prostate, and fixing the urethrotome in the groove of the staff, and holding it steady, rose from the kneeling posture, in which he performed the outward incision. Thirdly, holding the urethrotome in the left hand, he passed another knife, the cystotome, along the groove of the urethrotome, and the beak of the cystotome being lodged in the groove of the urethrotome, it was pushed forwards, through the substance of the prostate gland into the bladder. Fourthly, drawing the cystotome a little backwards, he gave the staff to an assistant to be held steadily, and lifting a blunt gorget in the right hand, he placed the beak of it in the groove of the cystotome, and pushed it onwards, till it glided from the groove of the cystotome, along the groove of the staff into the bladder. Then, true to the principles of the apparatus major, and never forgetting his own peculiar theory, *little incision, and much dilatation*, he forced his fingers along the gorget, dilated the neck of the bladder, and so made way for the forceps. (*J. Bell's Principles, Vol.* 2.)

In 1741, Le Dran described an operation, the introduction of which has been claimed by several since his time. A staff being introduced, and two assistants keeping open the patient's knees, while a third stands on one side of him on a chair, (Le Dran says,) "I then raise up the scrotum, and directing the last assistant to support it with both hands, so as to avoid bruising it, by pressing it either against the staff, or the os pubis, I place his two fore-fingers on each side of the part, where the incision is to be made; one of the fingers being laid exactly along that branch of the ischium, which rises towards the pubes, and the other pressed upon the raphe, that the skin may be kept fixed and tight. While I thus place the fingers of the assistant, who supports the scrotum, I still keep hold of the handle of the staff, and direct it so as to form a right angle with the patient's body; at the same time taking care that the end of it is in the bladder. This position is the more essential, as all the other instruments are to be conducted along the groove of this. If the handle of the staff were kept inclined towards the belly, the end of it would come out of the bladder, and the gorget, missing its guide, would slip between that and the rectum.

"The staff being rightly placed, I take the knife from the assistant, who holds the instruments, and put it into my mouth; then pressing the beak of the staff against the rectum, I feel the curvature of it through the perinæum. The incision ought to terminate an inch and a half below where we feel the bottom of the curvature. If we do not carry this incision sufficiently low, it may happen not to be of a size to allow the extraction of a large stone, and might lay us under the necessity of extending it further afterward, for the skin will not lacerate here, nor easily give way for the passage of the stone. I therefore begin the incision from the lower part of the os pubis, continuing it down to the place that I before directed for its termination; after which I pass the point of the knife into the groove of the staff, and cutting from below upwards, without taking the point out of the groove, I open the anterior part of the urethra as far as the incision that is in the skin.

"The beak of the staff, which was pressed upon the rectum, must now be raised and pressed against the os pubis. At the same time, I turn the handle towards the right groin, that the groove, which is at the beak of the staff, may face the space between the anus and the tuberculum ischii on the left side. Then carrying the point of the knife down the groove, I slide it along the beak, turning the edge, that it may face the space between the anus and tuberosity of the ischium. By this incision, I exactly divide the bulb of the urethra, and by doing this on its side, we are sure to avoid wounding the rectum, which for want of this precaution has been often cut. This first incision being made, I again pass the point of the knife into the curvature of the staff to the part where it bears against the perinæum, and direct it to be held there by the assistant who supports the scrotum. This done, I take a large director, the end of which is made with a beak, like that of a gorget, and conveying this beak upon the blade of the knife, into the groove of the staff, I draw the knife out. I then slide the beak of this director, along the groove of the staff, into the bladder, and I withdraw the staff, by turning the handle towards the patient's belly. The following circumstances will sufficiently satisfy us, that the director is introduced into the bladder; first, if it strikes against the end of the staff, which is closed; secondly, if the urine runs along the groove. I next feel for the stone with this director, and having found it, endeavour to distinguish its size and surface, in order to make choice of a proper pair of forceps; that is, one of a stronger or weaker make, or of a large or small size, agreeably to that of the stone; after which I turn the groove towards the space, between the anus and tuberosity of the ischium, and resting it there, convey a bistoury along the groove, the blade of which is half an inch broad, and about three quarters of an inch long. I continue the incision made by the knife in the urethra, and entirely divide the prostate gland laterally, as also the orifice of the bladder; and, I am very certain, that the introducing the use of these two instruments, which are not employed by other lithotomists, does not prolong the operation a quarter of a minute, but rather shortens the time, both by facilitating the dilatation, that is afterward to be made with the finger, and by rendering the extraction of the stone more easy. The bistoury being withdrawn, the groove of the director serves to guide the gorget into the bladder. I then introduce my fore-finger along the gorget, (which is now easily done, as the urethra and prostate, being divided, do not oppose its entrance) and with it I dilate the passage for the stone, in proportion to the size, of which I discover it to be. This dilatation being made, I withdraw my finger, and use the proper forceps." (*Le Dran's Operations, Edit.* 5, 1784, *London.*)

Professor Pajola, of Venice, was the pupil of Le Cat, and his method resembles that of his master. He is stated to have cut for the stone 550 patients with success; which deserves notice, because his operation has for its principles, dilatation, and no division of any part of the bladder. He makes an incision into the groove of the staff, with a lancet-pointed, double-edged knife, called an urethrotome, the blade of which has upon its centre a groove, that is continued to its very point, and serves to guide the beak of another instrument, called the cystotome, into the groove of the staff. As the professed intention of the cystotome is only to cut the prostate gland, its name is ridiculous. It consists of a handle, and very slender blade, which is not connected with the handle, but with its sheath, by means of a little joint, close to the beak of the instrument. When the cystotome is opened as far as possible, the end of the blade furthest from the beak, is twelve lines from the sheath. In this position, it is held by a transverse piece of steel, which admits of being pushed more or less out at the option of the surgeon, and can be fixed by means of a screw. Pajola, like Scarpa, considers cutting the neck of the bladder dangerous, and he merely divides the prostate, after which he introduces a blunt gorget, and along this a species of forceps for dilating the neck of the bladder in all directions. (*X. F. Rudtorffer über die Operation des Blasensteins nach Pajola's Methode.*) As Langenbeck observes, great as the success of this lithotomist has been, his method of operating has little to recommend it; and every thing must be ascribed to his individual skill, and intimate knowledge of the parts. Langenbeck even prefers Le Cat's method, in which there is no need of such a multiplicity of instruments. The blunt gorget and dilator are perfectly unnecessary, as the finger would do the purpose of both.

In the former editions of this Dictionary, I have not taken any notice of what has been termed by the French, "*Operation à deux temps*," and which was first mentioned by Franco. If, by this plan, it be intended, that the incision should be made at one period, and the extraction of the stone not attempted till a subsequent period, I cannot too strongly reprobate the practice. But, if I am to understand, that the postponement of the completion of the operation is only to be adopted, as a matter of necessity, when the patient cannot bear the longer continuance of the unsuccessful efforts to extract the stone, of course, I can only say, that every endeavour should be used to avoid this very disagreeable dilemma, by making in the first instance an adequate opening, and (if this cannot be done) by breaking the calculus, and carefully removing all the fragments. Some further considerations against delaying the completion of the operation will be found in the 2d vol. of the First Lines of Surgery.

The danger of the beak of the gorget slipping out of the groove of the staff, is one of the chief objections urged against the employment of the first of these instruments. In order to obviate this inconvenience, Sir Charles Blicke had the groove of the staff, and the beak of the gorget, so constructed that they locked into each other, and continued fixed till near the extremity of the staff. The contrivance, though plausible and ingenious, is not much used: the point of contact of the beak and body of the instrument is necessarily so small, that it is liable to break. It is allowed, however, that this objection might be removed; but another one is still urged, viz. the beak and groove catching on each other, so as to resist the efforts made to introduce the gorget into the bladder. Every operator knows, that much of the safety of the lateral operation, as performed at present, depends on the ease with which the beak of the gorget slides along the groove of the staff. Le Cat, in 1747, is said to have devised a similar intention.

Some operators have a good deal of trouble in dissecting into the groove of the staff. Sir James Earle invented an instrument to render this part of the operation more easy. It consists of a short staff, with an open groove, connected by a hinge with the handle of another staff, of the usual size, shape, curvature, and length, which may be called the *long staff*. The hinge, by means of pin, is capable of being disjointed at pleasure. The short staff is sufficiently curved to go over the penis and scrotum, and long enough to reach to that part of the long staff which is just below the beginning of its curvature. The end of the short staff, made somewhat like a pen, with the sides sharpened and finely pointed, is adapted to shut into the groove of the long staff, and its cutting edges are defended from being injured by a proper receptacle which is prepared for it in the groove of the long staff. When the instrument is shut, the groove of the short staff leads into that of the long one, so as to form one connected and continued groove. The short staff is rendered steady by the segment of an arch projecting from the long one through it.

The long staff, separated from the short one, is first introduced in the usual manner, and, the stone having been felt, the short staff is to be put on the other at the hinge. The incision is then to be made in the usual manner, through the skin and cellular membrane, and a second incision through the muscles, so as nearly to lay bare the urethra. The operator then being perfectly convinced that the extremity of the long staff is sufficiently within the bladder, must bring the end of the short staff down, and press it against the urethra, which it will readily pierce, and pass into the cavity prepared for it in the groove of the long staff. The two pieces being now firmly held together by the operator's left hand, nothing remains to be done, except applying the beak of the gorget to the groove of the short staff, and pushing it on till it is received in the groove of the long one; and if this latter be made with a contracted groove, it will just enter where the contraction begins, and thus must be safely conducted into the bladder. (*Earle on the Stone; Appendix; Edit.* 2, 1796.) Deschamps describes an instrument, invented by Jardaa, surgeon of Montpelier, which bears a resemblance to Earle's double staff, but was more complicated, being designed to support the scrotum, and also press the rectum out of the way.

The late Mr. Dease, of Dublin, and Mr. Muir, of Glasgow, considering that the gorget was more apt to slip from the staff in consequence of the latter being curved, and that its beak never slips from the groove of the staff in operating on women, proposed, like Le Dran, to convert the male into the female urethra. They introduce, as usual, a curved grooved staff into the bladder, make the common incisions, and open the membranous part of the urethra; but instead of introducing a gorget on the curved staff, they conduct along the groove a straight director, or staff, into the bladder, and immediately withdraw the other. The gorget is then introduced. In this manner the operation may be very well performed with a narrow bistoury, as was advised by Mr. A. Burns.

LITHOTOMY, AS PERFORMED WITH A KNIFE, INSTEAD OF A CUTTING GORGET, BY SEVERAL OF THE MODERNS.

We have already described, how Frère Jacques and Cheselden, used to operate with a knife, without any cutting gorget, in the early state of the lateral operation. The success which attended the excellent practice of the latter surgeon, certainly far exceeds what attends the present employment of the gorget, for, out of 52 patients whom he cut successively for the stone, he only lost two; and out of 213, of all ages, constitutions, &c. only 20. These facts are strongly in favour of abandoning the use of the gorget, and doing its office with a knife.

The objections to the gorget are numerous and well founded. In the hands of many skilful operators, its beak has slipped out of the groove of the staff, and the instrument has been driven either between the rectum and the bladder, or into the intestine instead of the latter viscus. Sir James Earle remarks: "I have more than once known a gorget, though passed in the right direction, pushed on so far, and with such violence, as to go through the opposite side of the bladder." Bromfield, even when operating with a blunt gorget, perforated the bladder and peritonæum, so that the abdominal viscera came out of the wound. (*P.* 270.) I now know of at least three instances, in which the gorget, slipping from the staff, completely severed the urethra from the bladder; the stone was not taken out; and the patients died.

We will suppose, however, that the preceding dangers of the gorget are surmounted, as they certainly may be, by particular dexterity, seconded by the confidence of experience. The gorget is introduced, but whatever kind of one has been used, the wound is never sufficiently large for the easy passage of any stone, except such as are below the ordinary size. Camper has noticed this fact: "Hawkensius solo conductore, cujus margo dexter in aciem assurgit, idem præstat: *omnes plagam dilatant, ut calculum extrahant: dilacerentur igitur semper vesicæ ostium et prostata.*" (*P.* 114.) Dease says: "In all the trials that I have made with the gorget on the dead subject, I have never found the opening into the bladder sufficiently large for the extraction of a stone of a middling size, without a considerable laceration of the parts. I have frequently taken the largest-sized gorget, and could not find, in the adult subject, I ever entirely divided the prostate gland, if it was any way large; and in the operations that were performed here on the living subject, if the stone was large, the extraction was painfully tedious, and effected with great difficulty, and, in some cases, not at all."

I shall dismiss this part of the subject with referring the reader to the spirited and correct remarks on the objections to the gorget in Mr. John Bell's Principles, Vol. 2. Part 2.

The latter author recommends the external incision, in a large man, to commence about an inch behind the scrotum, and to be carried downwards three inches and a half, midway between the anus and tuberosity of the ischium. The fingers of the left hand, which at first kept the skin tense, are now applied to other purposes. The fore-finger now guides the knife, and the operator proceeds to dissect through fat and cellular substance, and muscular and ligamentous fibres, till the wound is free and open, till all sense of stricture is gone; for it is only by feeling opposition and stricture that we recognize the transverse muscle. When this hollow is fairly laid open, the external incision, *which relates merely to the free extraction of the stone, is completed.* If it were the surgeon's design to operate only with the knife, he would now push his fingers deeply into the wound, and, by the help of the fore-finger, dissect from the urethra along the body of the gland, till he distinguished its thickness and solidity, and reached its back part. Then, plunging his knife through the posterior portion of the gland, and settling it in the groove of the staff, he would draw it firmly and steadily towards him, at the same time pressing it into the groove of this instrument, and then the free discharge of the urine, assuring him that the prostate and neck of the bladder were divided, he would lay aside his knife, pass the left fore-finger into the bladder, withdraw the staff, and introduce the forceps. (*John Bell, p.* 197.)

Mr. Charles Bell describes the following method of operating with a knife, instead of a gorget. A staff grooved on the right side, a scalpel with a straight back, and the common lithotomy forceps, are the indispensable instruments. The staff is kept in the centre, and well home into the bladder. The surgeon making his incision under the arch of the pubes, and by the side of the anus, carries it deeper towards the face of the prostate gland; cutting near to the staff, but yet not cutting into it, and avoiding the rectum by pressing it down with the finger. Now carrying the knife along the staff, the prostate gland is felt. The point of the knife is run somewhat obliquely into the urethra, and into the lateral groove of the staff, just before the prostate gland. It is run on, until the urine flows. The fore-finger follows the knife, and it is slipped along the back of it, until it is in the bladder. Having carried the fore-finger into the bladder, it is kept there, and the knife is withdrawn. Then the forceps, directed by the finger, are introduced. (*C. Bell's Operative Surgery, Vol.* 1, *p.* 361.)

Mr. Allan Burns, of Glasgow, recommends the following method: "The plan (says he) introduced by Cheselden, and revived by Mr. J. Bell. I would assume, as the basis of the operation; but still, along with their mode, I would blend that of Mr. Dease, by which, I imagine, we may overcome some of the disadvantages attendant on each considered individually.

"For more than twelve months, I have been in the habit of showing such an operation, which is as simple in its performance, as the one in general use, is attended with less danger to the patient, permits of an incision varying in size, according to the wish of the operator, and completely prevents injury of the rectum, or pudic artery. To perform this operation, I introduce into the urethra a common curved staff, then make the usual incision into the perinæum, divide fully and freely the levator ani, so as to expose the whole extent of the membranous part of the urethra, the complete extent of the prostate gland, and a portion of the side of the neck of the bladder. When this part of the operation is finished, I open the membranous part of the urethra, and introduce through the slit a straight or female staff, with which I feel the stone, and then withdraw the curved staff. This done, I grasp the handle of the staff firmly in my left hand, and with the right lay hold of the knife. Having ascertained that the two instruments are in fair contact, I rest the one hand upon the other, pressing them together, and then by a steady extraction, I pull out the knife and staff together, which is preferable to drawing the knife along the staff; it prevents the risk of the one slipping from the other; it guards the bulb of the urethra, and every other part from injury; for, between them and the cutting instrument, the staff is interposed;" &c. "When introducing the knife, the side of the blade must be laid flat along the fore-finger of the right-hand which is to project a little beyond the point. In this state the finger and knife are to enter the wound, opposite the tuber ischii; but, in proportion as they pass along, they are to be inclined forward, till at last, with the point of the finger, the staff is to be felt through the coats of the bladder, a little beyond the prostate, and rather higher than the orifice of the urethra. Here the knife is to be pushed, with the finger, through the bladder, and when the point is fairly fixed in the groove of the staff, the operation is to be finished by the steady extraction of both instruments." (*Allan Burns, in Edinburgh Surgical Journal, No.* 13.)

The knife of Cheselden does not require so much violence to divide the parts as the gorget does; cannot slip in some instances before, in others behind the bladder; and it will make a wound sufficiently ample for the easy extraction of the stone, without the least laceration. The possibility of its wounding the rectum, Dr. Thomson thinks might be obviated by employing it as follows "After having made the external incisions, and divided the membranous part of the urethra, in the way that it is usually done for the introduction of the beak of the gorget, a straight-grooved staff is to be introduced into the groove of the curved staff, and pushed along it into the bladder. The curved staff is then to be withdrawn, and the surgeon, laying hold of the handle of the straight staff with his left hand, and turning the groove upwards and a little outwards, presses the back of it downwards towards the right tuber ischii, and holds it steadily in that position. The point of a straight-backed scalpel being now introduced into the groove of the staff, with its cutting edge inclined upwards and a little outwards, is to be pushed gently forwards into the bladder. The size of the scalpel need only be such as will make a wound in the prostate gland and neck of the bladder, sufficiently large to admit the fore-finger of the left-hand. The scalpel being removed, this finger is to be introduced into the bladder, through the wound which has been made, and the staff may then be withdrawn. With the finger the surgeon endeavours to ascertain the size and situation of the stone. If, after this examination, he judges the incision in the neck of the bladder to be too small for the easy extraction of the stone, he next introduces into the bladder a straight probe-pointed bistoury, with its side close to the forepart of his finger, and its cutting edge upwards. By turning this edge towards the left side, and by keeping the point of his finger always beyond the point of the bistoury, he may safely divide, in the direction of the first incision, as much of the prostate gland, and neck of the bladder, as he shall deem necessary." (See *Observations on Lithotomy, &c. with a Proposal for a new Manner of Cutting for the Stone, by J. Thomson, M. D. one of the Surgeons of the Royal Infirmary, &c. Edinb.* 1808.) In this small work, the reader will find additional particulars.

Mr. Allan, who is a strenuous advocate for using the knife instead of the gorget, directs us, after laying bare the urethra, and bringing the staff so as to form a right angle with the patient's body, to feel that the instrument is fairly lodged in the bladder. The operator is to use the fore-finger of his left-hand as a director in feeling for the groove in the staff, and in distinguishing the prostate gland; and, with this finger, he is to depress the rectum, and direct the deeper part of his dissection. "Feeling the gland, with the point of the fore-finger of the left-hand, and the groove of the staff in the upper part of the wound, the assistant is desired to steady his hand, and the operator, holding his knife as he does a writing pen, his fingers an inch and a half from the point, turns up its edge towards the staff, and strikes its point through the membranous part of the urethra into its groove, half an inch before the prostate gland. He now turns the back of the knife to the staff, slides it a little backwards and forwards in the groove, that he may be sure he has fairly entered; then shifts the fore-finger, with which he guides the incision, places it under the knife, and carries always before the point of it, to prevent the rectum being wounded; he then lateralizes the knife, enters the substance of the prostate, is conscious of running the scalpel through its solid and fleshy substance, and judges, by the finger, of the extent of the incision which he now makes. The urine flows out; he slips his finger into the opening, withdraws the scalpel, and gives it to an assistant, who hands him the forceps, which he passes into the bladder, using the fore-finger of his left-hand, which is still within the wound, as a conductor. The forceps instantly encounter the staff, which serves to conduct them safely into the bladder, while the finger guides them through the wound; &c." (*Allan on Lithotomy, p.* 48, *Edinb.* 1808.)

I leave the reader to judge, which of the foregoing modes of operating with a common knife claims the preference. Perhaps Cheselden's manner, which is also Mr. John Bell's, is as deserving of recommendation as any.

The methods of operating with a knife, as practised by Klein and Langenbeck, I shall not here repeat, as they were described in the last edition of the First Lines of Surgery, accompanied with many valuable practical observations made by these judicious and skilful surgeons.

That the performance of lithotomy with a knife, when the operator has the assistance of a proper staff, cannot be difficult, may be inferred from there being no particular difficulty in the method, even when no staff at all is employed. In the spring of the year 1814, when at Oudenbosch in Holland, I was requested by Sergeant Ryan, of the 1st Foreign Veteran Battalion, to see his little boy, about four years old, who was troubled with symptoms, which made me immediately suspect, that there was a stone in the bladder. As I had no sound, I introduced into this viscus a small silver catheter, which distinctly struck against a calculus. Without taking the instrument out again, I determined to perform lithotomy with a common scalpel. Indeed, no other mode could be adopted, as we had neither staff, gorget, nor lithotomy instruments of any kind. After making the external part of the incision in the common way, I found that the catheter afforded me no guidance. I therefore withdrew it, and dissected deeply by the side of the prostate gland, till the fore-finger of my left hand passed rather beyond it. The scalpel was then plunged into the bladder, behind this gland, under the guidance of my left fore-finger, and with the edge turned towards the urethra. The necessary division of the prostate and neck of the bladder was then made by cutting inwards and upwards in the direction of the rest of the wound. With a small pair of ordinary dressing forceps, a calculus, rather larger than the end of the thumb, was easily extracted. This operation was done at the Military Hospital, in the presence of Dr. Shanks of the 56th regiment, and several other medical officers. Not a single bad symptom ensued, although the army unexpectedly moved into the field three days afterward and the child travelled about for some time in a baggage cart, in an exposed and neglected state. The wound was consequently rather longer in healing than usual; but, this was the only ill effect. The little boy in the end completely recovered.

Of late years, many surgeons have chosen to perform lithotomy with several kinds of beaked scalpels. The practice, indeed, is still gaining ground. Mr. Thomas Blizard's knife is one of the best. Its blade is long, straight, and narrow, and, like the gorget, is furnished with a beak, by means of which it admits of being conducted along the groove of the staff into the bladder, after the external incisions have been made. The staff is then withdrawn, and the operator has now the power of making the incision through the prostate and neck of the bladder downwards and outwards to any extent, which the parts will allow, or the case require. This is one of the principal advantages which beaked long narrrow knives have over gorgets, which, after their introduction, cannot be further used for the enlargement of the wound. The narrow knife will also cut more safely downwards and outwards than any gorget; nor is it subject to the serious danger of slipping away from the staff, and going we know not where; because the moment its beak and extremity have entered the bladder, the staff is no longer necessary, as the proper extent of the blade will then readily pass in without the aid of any conductor at all. I need hardly observe, also, that, in this method, we have nothing like the perilous and violent thrust of the gorget, which, in the event of a little unsteadiness in the operator's hand, or of any fault either in the position of the staff, or the direction of the gorget, will do irremediable and fatal mischief.

A FEW GENERAL REMARKS ON THE BEST MODE OF MAKING THE INCISION IN THE LATERAL OPERATION; AND SOME REFLECTIONS ON THE PRINCIPLES INCULCATED BY PROFESSOR SCARPA.

Perhaps of all the great operations in surgery, lithotomy is that, in which great awkwardness, mortifying failures, and dangerous blunders, are most frequently observed. Many a surgeon, who contrives to cut off limbs, extirpate large tumours, and even tie aneurismal arteries, with *eclat*, cannot get through the business of taking a stone out of the bladder in a decent, much less, a masterly style. This fact is so familiarly known in the profession, and its truth so often exemplified, that I may well be excused the unpleasant task of relating in proof of it all the disasters, which have come to my own personal knowledge. But, I must take the liberty of remarking, that, in this branch of surgery, a great number of individuals do not profit by these instructive lessons of experience. The more they see of lithotomy, the more they are convinced of its dangers; yet, too often, instead of studying the causes of ill success, they merely derive from the examples before them, a suspicion of the unskilfulness of the operator, or some discouraging conjectures about the difficulties of the operation.

The establishment of certain principles to be observed in lithotomy, appears the most probable way of diminishing the frequency of the accidents and failures of this common operation. If these principles are not violated, it is of less consequence what instrument is employed, for the surgeon may do nearly the same thing with an ordinary dissecting knife, a concealed bistoury, a beaked scalpel, or a well-made gorget.

After the very opposite principles, and different methods of cutting for the stone, which are explained in the preceding columns, as preferred by different surgeons, I think it may be useful to offer a few general observations on the proper direction and size of the incision. These points, which are of the highest practical consequence, in regulating the principles, which ought to be observed in lithotomy, are far from being settled, as must be plain to every body who recollects that Desault, Mr. John Bell, Klein, and Langdenbeck, have recommended a free opening; Scarpa, Callisen, and others, a small one; that Mr. Abernethy and Scarpa employ gorgets, which cut upwards and outwards, at angles of 45° and 69° from the axis of the urethra; and that the gorgets of Cruickshank, B. Bell, Desault, Mr. Cline, and most other surgeons are constructed for cutting either directly outwards, or outwards and inwards.

It appears to me, that the incision, through the whole of the parts cut in lithotomy, should always be made in a straight, regular, direct manner, from the surface of the skin in the perinæum to the termination of the wound in the urethra and bladder. In an adult subject, the external wound should commence about an inch above the anus. The impropriety of beginning it higher up has been duly insisted upon by Sharp, Bertrandi, Callisen, and every good writer on the operation. "Il ne faut couper l'urétre que le moins, qu'on peut, parcequ'on obtient par ce moyen une meilleure voie pour pénétrer dans la vessie sous l'angle du pubis. C'est avec raison que Sharp dit que l'incision de l'urètre faite au dessus de cet angle est si peu utile pour l'extraction de la pierre, qu'on n'en retireroit pas plus d'avantage en le coupant presque dans toute sa longueur." (*Bertrandi, Traité des Opérations, p.* 127.) And Callisen lays it down as a maxim: "Ut eæ partes haud sectione attingantur, quæ pro calculi egressu nihil faciunt; adeoque bulbus urethræ, et hujus pars corpore spongioso circumdata intacta relinquatur." (*Systema Chirurgiæ Hodiernæ; Pars Posterior; p.*655.)

Extraordinary as it may seem, it is not the less true, that cutting too much of the urethra is one of the most common faults still committed by modern surgeons. The incision in the integuments is to be large, that is to say, at least, three inches in length in an adult subject, because a free opening in the skin is not only exempt from danger, but attended with many advantages, especially those of facilitating the other steps of the operation, and preventing any future lodgment and effusion of urine. The external wound ought to be directed towards a point situated a very little towards the anus, from the innermost part of the tuberosity of the ischium. From the line, thus made, the incision should be carried inward and upward, through all the parts between it and the side of the prostate gland. Another line, extending from the inferior angle of the wound to the termination of the cut in the bladder, forms the precise limits, to which the depth of the incisions should reach, and no further.

The great principle of making the axis of the wound as straight and direct as possible, should always be kept in view, whether the surgeon employ a common scalpel, which cuts into the bladder, from without inwards, or other instruments, which divide the prostate gland, and neck of the bladder, from within outwards, like the bistoire caché, beaked knives, and every kind of cutting gorget. In the latter circumstance, the only difference consists in cutting, from the bladder and urethra, downwards and outwards *towards a point, situated a little way more inwardly than the tuberosity of the ischium,* instead of carrying the incision from this point, upwards and inwards, through the side of the prostate gland and the orifice of the bladder. The following may be enumerated as important advantages of attending to the foregoing principle:

1. The wound is made in that direction, which affords the greatest room for the extraction of large stones; and the axis of the incision being also as nearly straight as possible, the introduction of forceps, and the passage of the calculus outward, are materially facilitated.

That these are important advantages, I think every surgeon will allow, who knows how much the pain and danger of lithotomy depend upon the injury which the parts suffer from the force sometimes used in the extraction of the stone, and the repeated introduction of the forceps. Cheselden, the most successful lithotomist England ever produced, made the incision in the direction here recommended, sometimes inward and upward; sometimes outward and downward. The following remarks of another excellent surgeon merit particular attention:—J'ai vu plusieurs fois dans les Hôspitaux de Paris, que les Chirurgiens, coupant trop en haut vers l'angle du pubis, sentoient une grand résistance au périné, quand ils vouloient retirer le calcul avec les tenettes; on voyoit le périné se tuméfier par la pression, qu'y faisoit la pierre; en ce cas, quelques operateurs plus sages abandonnoient la pierre, introduisoient de nouveau le gorgeret, et en tournant en dessous la cannelure de celui ci, prolongeoient l'incision obliquement vers la tuberosité de l'os ischion; et enfin à la faveur de cette plus grande ouverture, retiroient la pierre sans causer de dechiremens." (*Bertrandi, Traité des Opérations, p.* 133.) Larger stones may likewise be thus extracted, without being broken, than in any other mode of making the lateral incision, as must be obvious to every practitioner, who recollects the very limited room, afforded at the upper part of the triangular space, between the arch of the pubes, the ramus of the ischium, and the neck of the bladder. This consideration cannot fail to have great weight with all surgeons, who feel duly convinced, how unsatisfactory a method it is to break a calculus, in order to get it out of the bladder. The measures necessary for the removal of all the fragments protract the completion of the operation, and seriously increase its danger; while the continuance of a single part of the stone behind may cause a renewal of all the grievances, for the cure of which the patient submitted to the operation. By these remarks, however, I am far from meaning to say, that large calculi should not be broken; on the contrary, my only wish is, that the necessity for the practice may be avoided, as much as possible, by making a free incision into the bladder, and even enlarging the opening, if necessary, as far as can be done with safety. In short, instead of breaking the stone, I prefer the practice of Mr. Martineau, of Norwich, perhaps the most successful lithotomist now living in this country, as *out of 84 patients, whom he has cut, only two have died*; a statement highly favourable to operating with a knife, and making an adequate opening. "Should the stone be large, or there be any difficulty in the extraction, rather than use much force, while the forceps have a firm hold of the stone (says Mr. Martineau,) I give the handles to an assistant, who is to draw them outwards and upwards, while the part forming the stricture is cut; which is easily done, as the broad part of the blade becomes a director to the knife; and rather than lacerate, I have often repeated this enlargement of the inner wound two or three times." (See *Med. Chir. Trans. Vol.* 11, *p.* 411.) The great advantage of the knife over the gorget, and even the necessity of employing it for adapting the size of the opening in the bladder to the magnitude of the stone, or its fragments, are most convincingly exemplified in several cases recently put upon record. Thus Klein, with the aid of a common scalpel, extracted a calculus, which weighed twelve ounces, thirty grains; and the patient recovered. (*Pract. Ansichten Bedeutendsten Operationen, H.* 1.) In 1818, Mr. Mayo, of Winchester, operated with a knife, and extracted a calculus, which broke in the forceps, weighing fourteen ounces, two drachms, avoirdupoise, and the patient recovered. (See *Med. Chir. Trans. Vol.* 11, *p* 54, *&c.*) Mr. W. B. Dickenson, of Macclesfield, also succeeded with Mr. Gibson's knife, in taking out of the bladder a calculus, the fragments of which weighed eight and a half ounces, and the patient was saved. (*Vol. cit. p.* 61.) And in the same volume may be seen other instances, in which immense calculi were removed from the bladder with various results, but particularly one which weighed sixteen ounces, and which Sir A. Cooper could not succeed in breaking: he was therefore obliged to enlarge the wound, first made with the gorget "to the sacro-sciatic ligament," when with the aid of a hook applied to the forepart of the stone behind the pubes, and the simultaneous assistance of the forceps, he succeeded with considerable difficulty in removing this immense mass. The patient lived, however, only four hours after the operation. (See *Med. Chir. Trans. Vol.* 11, *p.* 73.)

2. The arteria pudica profunda can never be injured, because the surgeon does not let the knife, or gorget, approach nearer to the ischium, than a point which is situated a little way from the tuberosity of that bone towards the anus; and consequently the edge of the instrument cannot come into contact with the inside of the tuberosity and ramus of the ischium where the great pudic artery is situated.

3. The rectum will not be wounded, because the direction of the axis of the incision, either downwards and outwards to the above-mentioned point, or from that point inwards and upwards, sufficiently removes the edge of the knife, or gorget, from the intestine. But, the rectum will be in still greater safety, if it be pressed downward with the fore-finger of the left-hand in the wound, and the prudent custom of emptying it, by means of a clyster, a short time before the operation, be not omitted; for, no lithotomist should ever forget, that, when this bowel is considerably distended with feces, it rises up a little way on each side of the prostate gland.

4. As the seminal duct penetrates the lower part of the substance of the prostate gland, in order to reach the urethra, and the knife, or other instrument, employed, divides the upper portion of the side of that gland inward and upward, or outward and downward, it is obvious that the duct will not be in the least danger of being cut.

The judicious Callisen is well aware of the advantages of making a smooth, even, direct incision into the bladder;* but, like Professor Scarpa, he is averse to making a free cut through the neck of that viscus. Indeed, as we shall presently notice, Scarpa does not sanction cutting any portion of the bladder at all.

Every practitioner, who will take the trouble to look over the history of the lateral operation, will find, that the greater number of lithotomists, who have particularly distinguished themselves by their unparalleled success, as Frère Jacques, Cheselden, Cosme, Mr. Martineau, Dr. Souberbielle, &c. made a free incision into the bladder. This fact alone is enough to raise doubts of the goodness of the advice delivered upon this subject by Callisen and Scarpa; especially, as neither they, nor any other modern surgeon (with the exception, perhaps, of Pajola, whose individual skill is said by Langenbeck to make amends for the disadvantages of his method,) can boast of having cut patients for the stones with a degree of success at all equal to that of the above-mentioned operators. The extraordinary success which characterized Cheselden's practice we have already detailed in this volume. The accounts, which we have, of the successful operation done by Frère Jacques and Cosme, are equally remarkable.

Mr. Martineau, as I have noticed, has lost but two patients out of 84, on whom he has operated, and this without making any selection, as he never rejected any one who was brought for operation. His patients were always kept a week in the house before operating; and this precaution, with a regulated diet, and perhaps a dose or two of opening medicine, was the only preparatory treatment. (*Med. Chir. Trans. Vol.* 11, *p.* 409.)

During my stay at Paris, in 1815, I saw Dr. Souberbielle extract a stone of considerable size, on the plan of his well-known ancestor. The incision was ample and direct, so that the calculus was taken out with perfect ease. Now, as the operations of this professed lithotomist are very numerous, and he enjoys the reputation of scarcely ever losing a patient, are we not justified in inferring, that the advocates for a small opening are promulgating the worst advice which can be offered to the practitioner? My own observations certainly tend to such a conclusion as will be presently explained. The tract recently published by Scarpa (*Memoir on the Cutting Gorget of Hawkins, &c. trans. by Briggs,*) has for its main objects the recommendation of a modification of Hawkins's gorget, and the inculcation of the propriety of making a small limited incision in the prostate gland, without cutting any part of the bladder. As sufficient room cannot thus be obtained for the extraction of even a stone of moderate size, he is an advocate for the gradual dilatation of the urethra and orifice of the bladder. He observes, that the lateral operation, though executed with the greatest precision, does not exempt the surgeon from dilating in a certain degree the orifice of the bladder, and cervix of the urethra, the dilatation of those parts, however moderate, being always necessary even where the calculus is of middling size. He states, that, in the adult, the orifice of the bladder dilates almost spontaneously to the diameter of five lines; and he adds, that the lateral incision, within proper limits, divides the body and base of the prostate gland to the depth of four, or, at most, five lines, forming with the five, to which the orifice of the bladder naturally yields, an aperture of ten lines. But, says Scarpa, in an adult, a stone of ordinary size and oval figure is sixteen lines in the small diameter, to which must be added the thickness of the blades of the forceps: consequently, even after the incision has been made with the most scrupulous exactness, the stone, though of moderate size, cannot pass out of the bladder, unless the dilatation of the base of the gland and orifice of the bladder be carried to the extent of nearly eight lines, beyond the size of the aperture made with the knife. But, says Scarpa, if, in order to avoid distending the parts to the extent of eight lines, the base of the prostate gland, together with the orifice of the bladder, and a part of its fundus, be divided to a depth equivalent to it, *the event would necessarily be an effusion of urine into the cellular membrane, between the rectum and bladder, and consequently suppuration, gangrene, fistulæ, and other serious evils.* (*Page* 4, 5.)

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* Vulnus sit æquale, haud angulatum, conicæ figuræ, apice vesicam respiciente, externa plaga ampla, et quatuor pollicum longitudine, unde effluxus sanguinis, puris, lotii, arenæ, facilitatur. See Systema Chirurgiæ Hodiernæ; Pars Posterior, p. 656, Hafniæ, 1800.

According to Scarpa, the apex of the prostate gland forms the greatest resistance to the introduction of the forceps and the extraction of the stone, and, therefore, ought to be completely divided; (*P.* 7.) but, he contends, that two, and sometimes three, lines of the substance of the base of the gland, should be left undivided; which, he asserts, is a matter of great importance, because the untouched portion, around the orifice of the bladder, prevents the effusion of urine, and the formation of gangrene, or fistulæ, between that part and the rectum. (*P.* 22.)

After this statement of one of the great principles, which Scarpa wishes to be observed in the performance of the lateral operation, a question or two naturally arise. Are we then to conclude, that the plan of making a free and direct incision into the bladder ought to be abandoned? Must we forget, that it is this method, which has answered so well in the hands of Cheselden and the several renowned lithotomists already enumerated? And must we believe, that the advice delivered upon this point by Bertrandi, Desault, Mr. John Bell, and all the best modern surgeons in this country, is founded only upon a capricious partiality to the free use of cutting instruments?

Earnestly as I respect the names of a Callisen and a Scarpa, their authority cannot influence me further, than I find it coincide with the dictates of experience,—the great arbitrator of every disputed point in practice.

We have seen, that an apprehension of effusion of urine, gangrene, fistulæ, &c. is the only reason assigned by Scarpa for his aversion to making a complete division of the side of the prostate gland, and orifice of the bladder. But, I would inquire, do we find extravasation of the urine, between the rectum and bladder, and gangrene, and fistulæ, so frequent after lithotomy in England, as to render it probable, that these ill consequences can ever proceed from our usual mode of dividing completely, not only the side of the prostate gland, but also the adjoining part of the bladder? Are such bad effects so often experienced in this country, as to constitute a material source of uneasiness in the mind of a surgeon about to undertake lithotomy? Do they form a substantial reason for abandoning the maxim of always endeavouring, as far as circumstances will allow, to make an incision of sufficient size for the easy removal of the calculus? And, would not Scarpa's method of stretching and dilating the wound, in order to get the stone out of the bladder, often dangerously prolong the operation; lead to much mischief from the repeated use of the forceps; cause serious contusion and lacerations of the parts; and, for all these reasons, render inflammation of the bladder and peritoneum very likely to follow?

In the course of the twenty-four years that I have been in the profession of surgery, I have seen the lateral operation performed an immense number of times, either with various kinds of gorgets, beaked knives, the lithotomie caché, or common scalpels. In all these examples the avowed intention of the surgeon was to make a free opening into the bladder. I do not mean, however, to say, that this was always actually accomplished, since the bad construction of the instruments employed, and other causes, sometimes frustrated the wise design of the operator. But, what was the consequence? Generally speaking, those surgeons who made only a small incision into the bladder, and kept their patients a long while upon the operating table, ere they succeeded in getting out the stone, by the repeated and forcible use of the forceps, had the mortification to see very few of their patients recover; a large proportion of them being carried off by peritonitis, on the third or fourth day after the operation.

On the contrary, when the incision was ample and direct, so that the calculus could be easily and gently removed, the patients were almost always saved.

During the first six or seven years of the long time during which I have enjoyed frequent opportunities of seeing lithotomy performed in St. Bartholomew's Hospital, gorgets were invariably used, most of which instruments made an insufficient opening. The consequence was, that many of the patients were detained a long while upon the operating table, before the stone could be extracted, and some considerable numbers were lost by peritonitis. Of late years, however, in the same institution, common scalpels and beaked knives have been often used; a freer opening has been generally made; and the proportion of deaths from peritonitis is strikingly lessened.

The following observation, made by Mr. Martineau, is also worthy of particular attention:—"In the first years of my practice," says he, "I was not very successful; and often witnessing many untoward circumstances in myself and others, which appeared to arise from the use of the cutting gorget, I determined to lay that instrument aside, and employ the knife only, and the *blunt* gorget as a conductor for the forceps." (*Med. Chir. Trans. p.* 405.)

Now, when we remember that this gentleman has lost only two out of eighty-four patients, on whom he has operated, his remarks are of great importance; and his cases, and the other facts, which I have specified, strongly impress my mind with the truth of all that I have urged, respecting the advantages of making the opening large, and in the best direction for the easy passage of the stone outward.

In Mr. Martineau's manner of operating, it is true, he does not make the external wound parallel to that in the bladder, as I venture to recommend, but directs it nearly in a line with the raphe; a circumstance which may, perhaps, account for his continuing the use of the blunt gorget as a conductor for the forceps. Neither is his internal incision carried downwards and outwards, as Bertrandi, Desault, and many other judicious surgeons consider most advantageous. But these defects (if I may presume to call them so) are rendered of less consequence by the rule, which Mr. Martineau observes, of *making his first incision long and deep*, and avoiding all stretching and laceration of the parts. Like Langenbeck (See *First Lines of Surgery, Vol.* 2,) he uses a staff, the groove of which is much wider and deeper than usual, and therefore more easily felt. This instrument his assistant holds, in the way preferred by Scarpa, nearly in an upright straight direction. "After the first incision (says Mr. Martineau) I look if the staff is not altered in its situation, and then feeling for the groove, I introduce the point of the knife into it, *as low down as I can, and cut the membranous part of the urethra, continuing my knife through the prostate into the bladder; when, instead of enlarging the wound downwards, and endangering the rectum, I turn the edge of the blade towards the ischium, and make a lateral enlargement of the wound in withdrawing the knife.*" (See *Med. Chir. Trans. Vol.* 11, *p.* 409.) This description is particularly interesting, as coming from a gentleman, who has had so much experience and success; and its value would have been increased, had the direction in which the edge of the knife was turned in the division of the prostate gland, been exactly specified.

With respect to the degree of importance, which ought to be attached to the fear of effusion of urine, between the bladder and rectum, gangrene, fistulæ, &c., I can only say, that they are inconveniences which are not commonly observed after lithotomy in this country. In two or three instances only I have known the urine come through the wound longer than usual, and these cases ended well. As for the extravasation of urine and sloughing, I shall merely remark, that although there cannot be a doubt of their occasional occurrence, they have not taken place after any of the numerous operations, with the results of which I have been acquainted.

All these facts and considerations, therefore, incline me to doubt whether the apprehension of the effusion of urine, fistulæ, &c. be sufficiently serious and well-founded to make it adviseable for surgeons to relinquish the plan of making a complete division of the side of the prostate gland, and neck of the bladder, in the operation of lithotomy. Nor is it at all clear to my mind, that effusion of urine and sloughing are likely to be the effect of practising a free opening. Indeed, whenever they do happen, I believe they proceed from a totally different cause, viz. from the incision in the skin being too small and too high up, and from the axis of the internal part of the incision not corresponding with that of the external wound. Hence the urine does not readily find its way outward, and some of it passes into the neighbouring cellular membrane.

In confirmation of the foregoing remarks, I beg leave to cite the sentiments of one of the greatest and most experienced of modern surgeons. Speaking of the defects of Hawkins's gorget, Desault observes, "La méthode de l'enfoncer horizontalement dans la vessie sur la catheter tenu à angle droit avec le corps, a deux grands desavantages: d'un côté celui de pénétrer par l'endroit le plus rétréci du pubis, et par conséquent de ne faire que difficilement une ouverture suffisante; d'un autre côté, celui de ne pas établir de parallélisme entre l'incision extérieure des tégumens qui est oblique et celle du col de la vessie et de la prostate, qui se trouve alors horizontale. De-là la possibilité des infiltrations par les obstacles qui les urines trouveront à s'écouler."

No doubt also some of the worst, and most dangerous urinary extravasations after lithotomy, have proceeded from another cause, pointed out by the same excellent surgeon. "Imprudemment porté dans la vessie, le gorgeret peut aller, par le stylet beaucoup trop long qui le termine, heurter, déchirer, perforer même la membrane de la vessie, et donner lieu à des infiltrations d'autant plus dangereuses, que le lieu d'ou elles partent est plus inaccessible. Cet accident est surtout à craindre, lorsque, comme les Anglais, on se sert de cathéter sans cul-de-sac." (See *Œuvres Chir. de Desault par Bichat, T.* 2, *p.* 460, 461.)

LITHOTOMY THROUGH THE RECTUM.

This method may be said to have been first suggested in a work published at Bâle, in the 16th century, by an author who assumed the name of Vegetius: "Jubet per vulnus recti intestini, et vesicæ aculeo lapidem ejicere," says Haller, in speaking of this writer. (*Bibl. Chir. Vol.* 1, *p.* 102.) But the proposal never received much attention until the year 1816, when M. Sanson, in France, gave an account of this manner of operating, and urged several considerations in favour of the practice. In that country, however, the operation has been performed only by Dupuytren, and, though the operation proved successful, the other French surgeons do not appear to have imitated him. Nor am I aware, that Dupuytren himself now continues the practice. Almost as soon as this method was heard of on the other side of the Alps, it was put to the test of experience by Barbantini, in a case where every other plan of operating appeared hardly practicable. "The connexion of the urethra with the rectum, prostate gland, and posterior part of the bladder, (says M. Sanson) made me easily perceive, that by dividing the sphincter ani and some of the rectum near the root of the penis, I should expose, not only the apex of the prostate gland, but a more or less considerable portion of this body, and that I should then be able to penetrate into the cavity of the bladder, either at the neck through the prostate, or at its posterior part." It was the latter method, which M. Sanson first tried upon the dead subject. The body was placed in the position usually chosen for the common ways of operating, and a staff was introduced, and held perpendicularly by an assistant. A bistoury, with its blade kept flat on the left fore-finger, was now introduced into the rectum, and the edge being turned upwards, M Sanson, with one stroke, in the direction of the raphe, cut the sphincter ani, and the lower part of the rectum. The bottom of the prostate gland being thus exposed, the finger was next passed beyond its solid substance, where the staff was readily perceptible through the thin parietes of the rectum and bladder. While the latter instrument was steadily maintained in its original position, M. Sanson here introduced the knife into the bladder, and, following the groove of the staff, made an incision about an inch in length. At this instant, the flow of urine from the wound indicated that the bladder had had an opening made in it. On examination, the parts divided were found to be the sphincter, the lower part of the rectum, the back part of the prostate, and the adjacent portion of the bladder. Another mode, contemplated by M. Sanson, was, after dividing the sphincter ani, to cut the termination of the membranous part of the urethra along the groove of the staff held perpendicularly, and by the same guidance to extend the incision in the median line through the prostate gland and neck of the bladder.

In Barbantini's case, the calculus was so large, that it made a considerable prominence in the rectum, where it was felt extending across from one tuberosity of the ischium to the other. On account of its size, its extraction by the lateral operation was considered impracticable, and, as it was not thought adviseable or easy to break such a mass, and Barbantini regarded the high operation as more difficult and uncertain in its results than the common method, it was determined to operate through the rectum. The attempt was delayed some days, by the impossibility of introducing effectually the staff, which was stopped at its entrance into the bladder by the calculus. But, as a grooved instrument was judged to be an essential guide, Barbantini caused a long director to be constructed, which he thought might be passed more conveniently than the staff, into the first incision. He also provided himself with long forceps, the blades of which were very broad, and admitted of being put separately over the stone. A staff having been introduced, the operation was done after M. Sanson's manner, except that a wooden gorget was introduced for the protection of the rectum, and the prostate gland was left undivided at the forepart of the wound. When the bladder had been opened at the lower part of the rectum, as far as the groove of the staff served as a guide, the latter instrument was withdrawn, and the long director introduced into the incision, which, under its guidance, was then enlarged to the necessary extent. With some difficulty the stone was then extracted, and found to weigh nine ounces and a half. For about eighteen days the urine passed away by the anus, only a a few drops occasionally issuing from the urethra. As this circumstance gave Barbantini some uneasiness, he introduced his finger into the bladder, the inner surface of which, near the wound, he found covered with encysted calculous matter, which was very adherent. At length, however, it was gradually removed, with a portion of new-formed membrane, by attempts repeated with the finger several days in succession. A catheter was then introduced, through which, at first, almost the whole of the urine flowed. But the tube being afterward obstructed with mucus, it became necessary frequently to clear it by injecting tepid water. The cure now seemed to proceed with rapidity. When the feces were hard, none of them passed into the bladder; but when they were liquid, a part of them were voided with the urine through the tube, though without any inconvenience. At the end of fifty days, scarcely any urine passed out of the wound; the patient, therefore, went into the country, where, in the course of another month, the cure was complete.

About a year ago, I saw an example, in which a calculus had made its way through the prostatic portion of the urethra, and formed, with the swelling of the soft parts, a considerable prominence within the rectum. If the patient had been under my care, I should certainly have made an incision directly on the tumour just within the sphincter, by which means the calculus might have been removed with great ease, and less risk than dividing the prostate. However, the latter method was followed, and the case had a very favourable termination. In this instance, as the sound, in its passage, only occasionally touched a small point of the calculus, which approached the urethra, and this just at the instant before its entrance into the cavity of the bladder, the exact nature of the case was for some time a matter of doubt to several skilful surgeons who were consulted. Respecting the merits of lithotomy through the rectum, I think the practice well deserving the consideration of the profession, where the calculus is known beforehand to be of unusual size. It must be less painful, I apprehend, than the high operation, and, perhaps, more easy of execution. But it is difficult, with the scanty experience before us, to offer any very decided opinion whether, on the whole, it ought to be preferred either to the high or the lateral operation, by which last, stones of larger size than that extracted by Barbantini, have been successfully taken out by Mr. Mayo, of Winchester, Dr. Klein, of Stuttgard, and others. The most serious consideration is, whether a large incision, forming a communication between the bladder and rectum, will generally heal up, as well, or even more favourably, than in Barbantini's case. This is a point which can only be decided by further observation. A smaller wound in the same part, it appears, is soon cured; for in the instance reported by Sanson, the boy was quite well on the twentieth day. For further information, consult *Sanson, Des Moyens de Parvenir á la Vessie par le Rectum*, 4to. *Paris*, 1817; *N. Barbantini Obs. relative à l'extraction d'un calcul urinaire très volumineux, operée au moyen de la taille vesicorectale*, 8vo. *Lucques*, 1819; *Journ. Complém. du Dict. des Sciences Med. T.* 6, *p.* 79, 8vo. *Paris*, 1820; *Dict des Sciences Med. T.* 28, *p.* 422, *&c.*

LITHOTOMY IN WOMEN.

Women suffer much less from the stone than men, and far less frequently stand in need of lithotomy. It is not, however, that their urine will not so readily produce the concretions which are termed urinary calculi. The reason is altogether owing to the shortness, largeness, and very dilatable nature of the female urethra; circumstances which in general render the expulsion of the stone with the urine almost a matter of certainty. The records of surgery present us with numerous instances, where calculi of vast size have been spontaneously voided through the meatus urinarius, either suddenly without pain, or after more or less time and suffering. Heister mentions several well-authenticated examples. Middleton has also related a case, where a stone, weighing four ounces, was expelled in a fit of coughing, after lodging in the passage a week. Colot speaks of another instance, where a stone, about as large as a goose's egg, after lying in the meatus urinarius seven or eight days, and causing a retention of urine, was voided in a paroxysm of pain. A remarkable case is related by Dr. Molineux in the early part of the Philosophical Transactions: a woman voided a stone, the circumference of which measured the longest way seven inches and six-tenths, and round about, where it was thickest, five inches and three quarters; its weight near two ounces and a half troy. And Dr. Yelloly has related an interesting example, in which a calculus, weighing three ounces, three and a half drachms troy, and lodged in the meatus urinarius, was easily taken out with the fingers. (See *Med. Chir. Trans. Vol.* 6, *p.* 577.) Dr. Yelloly also refers to several very remarkable instances, described in the Phil. Trans. Vols. 12, 15, 17, 20, 34, 42, and 55, proving what large stones will pass out of the female urethra, either spontaneously or with the aid of dilatation and manual assistance. Were any doubts now left of this fact, they would be immediately removed by other histories, especially those contained in a paper drawn up by Sir A. Cooper. (See *Med. Chir. Trans. Vol.* 8, *p.* 427, *&c.*)

Sometimes, after the passage of large calculi, the patient has been afflicted with an incontinence of urine; but, in general, this grievance lasts only a short time.

The occasional spontaneous discharge of very large calculi through the meatus urinarius led Frederic de Leauson to deliver the advice not to interfere with them, as he thought they would all present themselves sooner or later at the orifice of that passage, and admit of being taken away with the fingers. (See *Traité Nouveau pour aisément parvenir à la Vraie Curation de plusieurs belles Operations, &c. Genève.* 1674.)

When surgeons began to consider what very large calculi were sometimes spontaneously voided, and the large size, and dilatable nature of the female urethra, they suspected that it would be a good practice to dilate this passage by mechanical contrivances, until it would allow the stone to be extracted, and thus all occasion for cutting instruments might be superseded. With this view, Tolet first proposed suddenly dilating the passage with two steel instruments, called a male and female conductor, between which the fingers, or forceps, were passed for the removal of the calculus. (*Traité de la Lithotomie, Paris,* 1681.) But as it was afterward rightly judged, that the dilatation would produce less suffering and injury, if more gradually effected, Douglas suggested the practice of dilating the meatus urinarius with sponge or dried gentian root.

Mr. Bromfield has published the case of a young girl, in whom he effected the necessary dilatation by introducing into the meatus urinarius the appendicula cœci of a small animal in a collapsed state, and then filling it with water by means of a syringe; thus furnishing a hint for the construction of instruments on the principle of Mr. Arnott's dilator. The piece of gut, thus distended, was drawn out in proportion as the cervix vesicæ opened, and, in a few hours, the dilatation was so far accomplished, that the calculus had room to pass out. (See *Chir. Obs. and Cases, Vol.* 2, *p.* 276.)

Mr. Thomas met with a case, in which, after dilating the meatus urinarius with a sponge tent, he succeeded in extracting an earpicker which lay across the neck of the bladder. The passage was so much enlarged, that the left fore-finger was most easily introduced, and (says this gentleman) "I believe had the case required it, both thumb and finger would have passed into the bladder without the smallest difficulty." After adverting to this, and other facts, proving the ease with which the female urethra can be dilated, Mr. Thomas remarks: "If these relations can be credited, and there is no reason why they should not, I can hardly conceive any case, in a young and healthy female subject, and where the bladder is free from disease, where a very large stone may not be extracted, without the use of any other instrument than the forceps, the urethra having first been sufficiently dilated by means of the sponge tents. For this purpose, the blades of the forceps need not be so thick and strong as those commonly employed. (See *Medico-Chir. Trans. Vol.* 1, *p.* 123—129.) Many facts of a similar kind are on record, and one in which a large needlecase was extracted, is referred to in a modern periodical work. (See *Quarterly Journ. of Foreign Med. Vol.* 2, p. 331.)

Some surgeons have extracted stones from the female bladder in the following manner: the patient having been placed in the position commonly adopted in the lateral operation, a straight staff, with a blunt end, is introduced into the bladder, through the meatus urinarius. The surgeon then passes along the groove of the instrument the beak of a blunt gorget, which instrument becoming wider towards the handle, effects a part of the necessary dilatation. The staff being withdrawn, and the handle of the gorget taken hold of with the left hand, the right fore-finger with the nail turned downwards, is now introduced slowly along the concavity of the instrument. When the urethra and neck of the bladder have thus been sufficiently dilated, the finger is withdrawn, and a small pair of forceps passed into the bladder. The gorget is now removed, and the stone taken hold of, and extracted. (*Sabatier, Médecine Opératoire, T.* 2, *p.* 103.)

This plan, however, is liable to the objections arising from the dilatation being too suddenly effected; and the practice now generally preferred is that of gradually expanding the meatus urinarius with sponge tent. And, as the retention of the urine, during the continuance of the sponge, causes great irritation, I consider Mr. C. Hutchinson's suggestion of placing a catheter in its centre, as mentioned by Sir A. Cooper, as meriting attention. (See *Med. Chir. Trans. Vol.* 8, *p.* 433.)

Notwithstanding these favourable accounts of the practice of dilating the female urethra, for the purpose of removing calculi from the bladder, there are very good surgeons who deem an incision the best practice. It is certain, that some patients have found the method insufferably tedious and painful. But the strongest objection is the incontinence of urine, which occasionally follows any great distention of the urethra and neck of the bladder. Klein, one of the most experienced operative surgeons in Germany, states that he has tried both plans, and that the use of the knife is much less frequently followed by incontinence of urine. On the other hand, Mr. Thomas believes, that this unpleasant symptom is quite as often a consequence of the operation of lithotomy, as now usually performed. (*Med. Chir. Trans. Vol.* 1, *p.* 127.) When the stone is not very large, perhaps dilatation should be preferred; and, in other cases, an incision.

In females, lithotomy is much more easy of execution, and less dangerous, than in male subjects. It may be done in various ways; but the surgeons of the present time constantly follow the mode of making the requisite opening by dividing the urethra and neck of the bladder. Louis employed for this purpose a knife which cut on each side, and was contained in a sheath; Le Blanc, a concealed bistoury, which had only one cutting edge; Le Cat, his gorgeret-cystitome; Frère Come, his lithotome caché; and Fleurant a double-bladed lithotome caché. Of these instruments, the best, I think, is that of Frère Come. But, at present, every surgeon knows, that the operation may be done, as conveniently as possible, with a common director and a knife, that has a long, narrow, straight blade. A straight staff, or director, is introduced through the meatus urinarius; the groove is turned obliquely downwards and outwards, in a direction parallel to the ramus of the left os pubis; and the knife is thus conducted into the bladder, and makes the necessary incision through the whole extent of the passage, and neck of the bladder.

Louis and Fleurant, as I have said, were the inventors of particular bistouries for dividing both sides of the female urethra at once. The instrument of the former effected this purpose, in passing from without inwards; that of the latter, in passing from within outwards. Fleurant's bistoury bears some resemblance in principle to Frère Come's lithotome caché, or to the cutting forceps, with which Franco divided the neck of the bladder. The reason assigned in recommendation of these bistouries is, that they serve to make a freer opening for the passage of large stones, than can be safely made by cutting only in one direction. When the calculus is large, it is certainly difficult to procure a free opening, without cutting the vagina, in front of which passage, there is but little space under the pubes for the removal of the stone. Hence, Dubois invented a new method, which consists in dividing the meatus urinarius directly upwards towards the symphisis of the pubes, dilating the wound and keeping the vagina out of the way by means of a blunt gorget, and then taking out the calculus with the forceps. This method seems to me better devised for the protection of the vagina, than the acquirement of more room for the calculus, and whatever space is gained, is only gained by the distention of the parts, and the propulsion of them downwards. The plan is acknowledged to be very painful, yet generally successful, and not followed by any serious symptoms or incontinence of urine. (See *Dict. des Sciences, Méd. T.* 28, *p.* 436.) When the stone is known to be very large, Sabatier and some other modern surgeons prefer the apparatus altus.

A case may present itself, in which the posterior part of the bladder, drawn downwards by the weight of the stone, may displace a portion of the vagina, and make it protrude at the vulva in the form of a swelling. Here, there would be no doubt of the propriety of cutting into the tumour, and taking out the foreign body contained in it. Rousset performed such an operation, and Fabricius Hildanus in a case, where the stone had partly made its way into the vagina, enlarged the opening, and successfully extracted the foreign body.

Mery proposed to cut into the posterior part of the bladder through the vagina, after introducing a common curved staff; but the apprehension of urinary fistulæ made him abandon the project.

The existence of extraordinary circumstances may always render a deviation from the common modes of operating not only justifiable, but absolutely necessary. Thus, Tolet met with a case, where a woman had a prolapsus of the uterus, with which the bladder was also displaced. In the latter viscus, several calculi were felt: an incision was made into it, and the stones extracted, after which operation, the displaced parts were reduced, and a speedy cure followed. (*Sabatier, Médecine Opératoire, T.* 2, *p.* 107.)

The incontinence of urine, consequent to lithotomy in women, is by no means an unfrequent occurrence. Mr. Hey cut two female patients for the stone, both of whom were afterward unable to retain their urine, and were not quite well when discharged from the Leeds Infirmary. These cases led Mr. Hey in a third example to endeavour to prevent the evil, by introducing into the vagina a cylindrical linen tent, two inches long and one broad, with a view of bringing the edges of the incision together, without obstructing the passage of urine through the urethra. The plan answered, if it be allowable to make such an inference from a single trial. (See *Hey's Practical Obs. in Surgery, p.* 560. *Ed.* 1810.)

TREATMENT AFTER THE OPERATION.

If the internal pudendal artery should be wounded, and bleed profusely, the best plan is, if possible, first to take out the stone, and then introduce into the wound a piece of firm sponge, with a large cannula passed through its centre. The expanding property of the sponge, on its becoming wet, will make the necessary degree of compression of the vessel, which lies too deeply to be tied. When there is much coagulated blood lodged in the bladder, it is customary to wash it out by injecting lukewarm water.

I cannot say that it has fallen to my lot to see any cases (out of the great number which I have seen in Bartholomew's Hospital,) in which death could be imputed to hemorrhage, notwithstanding the bleeding has often been so profuse, and from so deep a source, just after the operation, as to create suspicion that it proceeded from the internal pudendal artery. Such hemorrhage generally stopped before the patient was put to bed.

The majority of patients who die after lithotomy perish of peritoneal inflammation. Hence, on the least occurrence of tenderness over the abdomen, copious venesection should be put in practice. At the same time, eight or ten leeches should be applied to the hypogastric region. The belly should be fomented, and the bowels kept open with the oleum ricini. The feebleness of the pulse should not deter the practitioner from using the lancet; this symptom is only fallacious; and it is generally attendant on all inflammation within the abdomen. It is a curious fact, that Mr. Martineau, who has lost only 2 out of 84 patients, whom he has operated upon for the stone, should *never* have found it requisite to bleed; but it appears to me, that, it is a much better argument in favour of the superior safety of operating with the knife and making a free opening, than reason for discouraging venesection, when inflammation of the peritoneum has come on, which, however, may not be this gentleman's meaning, as he says, "I believe, it will be found in adults, that death follows oftener from exhaustion, after a tedious operation, or from despondency, &c. than from acute disease;" (*Med. Chir. Trans. Vol* 11, *p.* 412.) a sentiment, which I am sure this gentleman would not have entertained, had he been present with me at the opening of the many unfortunate cases, which used formerly to occur in the practice with badly made gorgets in St. Bartholomew's Hospital. Together with the above measures, the warm bath, a blister on the lower part of the abdomen, and emollient glysters, are highly proper. I have seen several old subjects die of the irritation of a diseased thickened bladder, continuing after the stone was extracted. They had not the acute symptoms, the inflammatory fever, the general tenderness and tension of the abdomen, as in cases of peritonitis; but they referred their uneasiness to the lower part of the pelvis; and instead of dying in the course of two or three days, as those usually do, who perish of peritoneal inflammation, they, for the most part, lingered for two or three weeks after the operation. In these cases, opiate glysters, and blistering the hypogastric region, are the best measures. In some instances of this kind, abscesses form about the neck of the bladder.

Whoever wishes to acquire a perfect knowledge of the history of lithotomy should consult the following works: *Celsus de Re Medicâ, lib.* 7, *cap.* 26. *Remarques sur la Chirurgie de Chauliac, par M. Simon de Mingelouzeaux, tom.* 2.; *Bourdeaux* 1663. *La legende du Gascon par Drelincourt; Paris,* 1665. *Van Horne's Opuscula Marianus de Lapide Vesicæ par Incisionem extrahendo;* 1552. *G. Fabr. Hildanus, Lithotomia Vesicæ, 8vo. Lond.* 1640. *M. S. Barolitanus, De Lapide Renum. Ejusdem de Lapide Vesicæ per Incisionem extrahendo, 4to. Paris,* 1540 *Le Dran, Parallèle des Différentes Manières de tirer la Pierre hors de la Vessie, 2 Vol. 8vo.* 1730. *Sharp's Operations. Sharp's Critical Inquiry. Le Dran's Operations, Edit.* 5; *London,* 1781. *Franco's Traité des Hernies,* 1561. *Rosetus de Partu Cæsario. Traité de la Lithotomie, par F. Tolet, Paris, 5me Ed.* 1708. *Heister's Surgery, Part* 2. *Lithotomia Douglassiana,* 1723. *J. Douglas, History of the Lateral Operation, 4to. Lond.* 1726. *Fr. M. Colot, Traité de l'Opération de la Taille, &c. 12mo. Paris,* 1727. *Morand, Traité de la Taille au haut appareil, 12mo. Paris,* 1728 *J. Mery, Observations sur la Manière de Tailler, &c. pratiquée par Frere Jacques, 12mo. Paris,* 1700. *Cours d'Operations de Chirurgie par Dionis. Traité des Operations par Garengeot, Tom.* 2. *Morand Opuscules de Chirurgie. Bertrandi Traité des Opérations. Index Supellectilis Anatomicæ Ravianæ; Leidæ,* 1725. *J. G. Ilsemann, De Lithotomia Celsianæ Præstantiæ; Helmst.* 1745. *Le Cat, Recueil de Pièces sur l'Opération de la Taille Part* 1; *Rouen,* 1749. *Cosme, Recueil de Pièces Anatomiques importantes sur l'Opération de la Taille; Paris,* 1751—1753. *J. Douglas, Postscript to Hist. of the Lateral Operation;* 1726. *J. Douglas, Appendix to Hist. of the Lateral Operation;* 1731. *A short Historical Account of Cutting for the Stone, by W. Cheselden, in his own last edition of his Anatomy. Falconet in Thes. Chirurg. Halleri; thes.* 103, *T.* 4, *p.* 196. *Hartinkeil; Tractatus de Vesicæ Urinariæ Calculo, &c.* 1785. *Traité Historique et Dogmatique de l'Opération de la Taille, par J. F. L. Deschamps, 4 Tom. 8vo. Paris,* 1796. *This last work is a very complete and full account of the subject up to the time of its publication, and well merits a careful perusal. Richerand's Nosogr. Chir. T.* 3, *p.* 538, *&c. Ed.* 4. *Levéillé, Nouvelle Doctrine Chir. T.* 3, *p.* 533. *John Bell's Principles of Surgery. Vol.* 2, *Part* 1. *A. Burns, in Edinb. Med. and Surg. Journal, January,* 1808. *C. Bell's Operative Surgery, Vol.* 1, 1807. *Sabatier, de la Médecine Opératoire, Tom.* 3. *Edit.* 2, 1810. *Dr John Thomson's Observations on Lithotomy; Edinb.* 1808. *Also an Appendix to a proposal for a new manner of cutting for the Stone, 8vo. Edinb.* 1810. *Allan's Treatise on Lithotomy; Edinb.* 1808. *Earle's Practical Observations on Operations for the Stone; 2d Ed. with an Appendix containing a description of an instrument calculated to improve that operation, 8vo. Lond.* 1803. *Wm. Dease, Obs. on the different methods for the radical cure of the Hydrocele, &c. To which is added a comparative view of the different methods of cutting for the Stone, &c. 8vo. Lond.* 1798. *Œuvres Chir. de Desault par Bichat; Tom.* 2. *Wm. Simmons, Cases and Obs. on Lithotomy, 8vo. Manchester,* 1808. *C. B. Trye, Essay on some of the Stages of the Operation of cutting for the Stone, 8vo. Lond.* 1811. *Roux. Voyage fait à Londres en* 1814, *ou Parallèle de la Chirurgie Angloise avec la Chirurgie Françoise, p* 315, *&c. Paris,* 1815. *Schreger, Chirurgische Versuche, B.* 2. *von Steinschnitten an Weibern, p.* 135, *&c. 8vo. Nürnberg,* 1818. *C. J. M. Langenbeck, über eine einfache und sichere methodedes Steinschnittes, 4to. Wurzburg,* 1802. *F. X. Rudtorffer, Abhandlung über die Operation des Blasensteines nach Pajola's Methode, 4to. Leipz.* 1808. *A. Scarpa, A Memoir on the Cutting Gorget of Hawkins, &c. Transl. by J. H. Wishart, 8vo. Edinb.* 1816. *H. Mayo, W. Dickenson, H. Earle, and P. M. Martineau in Med. Chir. Trans. Vol.* 11. *Klein, Pract. Ansichten bedeutendsten Operationen, 4to. Stutgart,* 1816. *J. S. Carpue, Hist. of the High Operation, and An Account of the various Methods of Lithotomy, 8vo. Lond.* 1819. *Sir E. Home on Strictures, &c. Vol* 3, *8vo. Lond.* 1821. For a minute description and delineations of the parts concerned in the operation, see *Camper's Demonstrationes Anatomico-pathologicæ, lib.* 2. *Also L. F Von Froriep über die Lage der Eingeweide un Becken, nebst einer Darstellung derselben, 4to. Weimar,* 1815.

LOTIOA LUMINIS.—℞ Aluminis purif. ℥ss. Aquæ distillatæ ℔j. Misce.—Sometimes used as an astringent injection; sometimes as an application to inflamed parts.

LOTIO AMMONIÆ ACETATÆ.—℞. Liq. ammon. acetatæ; Spirit. vin. rectif.; Aquæ distillatæ; sing. ʒiv. Misce.—Properties discutient.

LOTIO AMMONIÆ MURIATÆ.—℞. Ammon. muriatæ ℥j. Spirit. rorismarini ℔j.—Has the same virtues as the preceding.

Justamond recommended it in the early stage of the milk-breast.

LOTIO AMMONIÆ MURIATÆ CUM ACETO.—℞. Ammon. Mur. ℥ss. Aceti, Spirit. vinos. rectif. sing. ℔j. Misce. This is one of the most efficacious discutient lotions. It is, perhaps, the best application for promoting the absorption of extravasated blood, in cases of ecchymosis, contusions, sprains, &c.

LOTIO AMMONIÆ OPIATA.—℞. Spiritus ammon. comp. ʒiiss. Aquæ distillatæ ℥iv. Tinct. Opii. ℥ss. Misce. Applied by Kirkland to some suspicious swellings in the breast, soda and bark being also given internally.

LOTIO CALCIS COMPOSITA.—℞. Aquæ calcis ℔j. Hydrargyri oxymuriatis ʒj Misce.—Properties strongly astringent. Ringworms, tetters, and some other cutaneous affections yield to this application, which however, should generally be diluted. In the latter state, it may occasionally be used as an injection for various purposes.

LOTIO GALLÆ.—℞. Gallarum contusarum ʒij. Aquæ ferventis ℔j. To be macerated one hour, and strained.—This astringent lotion is sometimes used with a view of removing the relaxed state of the parts, in cases of prolapsus ani, prolapsus uteri, &c.

LOTIO HYDRARGYRI AMYGDALINA.—℞. Amygdalarum amarorum ℥j. Aquæ distil. ℔j. Hydrarg. oxymuriatis ℈j. Rub down the almonds with the water, which is to be gradually poured on them; strain the liquor, then add the oxymuriate of mercury. This will cure several cutaneous affections.

LOTIO HYDRARGYRI OXYMURIATIS.—℞. Hydrargyri oxymuriatis gr. ijss. Arabici gummi ℥ss. Aquæ distillatæ ℔j. Misce.—This is the injection of corrosive sublimate in use at St. Bartholomew's Hospital.

LOTIO HYDRARGYRI OXYMURIATIS COMPOSITA.—℞. Hydrarg. oxymur. gr. x. Aq. distillat. bullientis ℥iss. Tinct. canthar. ℥ss. Misce.—This was ordered by Dr. H. Smith, to be applied every night to scrofulous swellings.

LOTIO HELLEBORI ALBI.—℞. Decocti hellebori albi ℔j. Potassæ sulphureti ℥ss. Misce.—This is occasionally employed as an application for curing tinea capitis, and some other cutaneous diseases.

LOTIO PLUMBI ACETATIS.—℞. Liq. plumbi acet ʒij. Aq. distill. ℔ij. Spirit vinos. tenuioris ʒij. The first and last ingredients are to be mixed before the water is added.

This is the common whitewash, an application universally known.

LOTIO POTASSÆ SULPHURETI.—℞. Potassæ sulph. ʒij. Aquæ distill. ℔j. Misce.—It is used in the same cases as the preceding application.

LOTIO OPII.—℞. Opii purif. ʒjss. Aquæ distillatæ ℔j Misce.—A very excellent application to irritable painful ulcers of every description. It is best to dilute it, especially at first.

LOTIO PICIS.—℞. Picis liquidæ ℥iv. Calcis ℥vj. Aquæ ferventis ℔iij.—To be boiled till half the water is evaporated. The rest is then to be poured off for use. This application is sometimes employed for the cure of tinea capitis; it is also of singular service in removing an extensive scorbutic redness, frequently seen on the legs, accompanying old ulcers.

LOTIO ZINCI SULPHATIS.—℞. Zinci sulphatis ʒj. Aq. ferventis ℔j. Misce. This is sometimes used by practitioners in lieu of the lotio plumbi acet. It forms a good astringent application for a variety of cases. When diluted, by adding two pints more water, it forms the common injection, so much recommended in cases of gonorrhœa.

LUES VENEREA. See VENEREAL DISEASE.

LUMBAR ABSCESS. *Psoas Abscess.* By these terms are understood chronic collections of matter, which form in the cellular substance of the loins, behind the peritonæum, and descend in the course of the psoas muscle. Patients, in the incipient stage of the disease, cannot walk so well as usual; they feel a degree of uneasiness about the lumbar region; but in general, there has been no acute pain, even when the abscess has acquired such a size as to form a large tumour, protruding externally. In short, the psoas abscess is the best instance, which can possibly be adduced, in order to illustrate the nature of those collections of matter, which are called chronic, and which form in an insidious manner, without serious pain, or any other attendant of acute inflammation.

The abscess sometimes forms a swelling above Poupart's ligament; sometimes below it; and frequently the matter glides under the fascia of the thigh. Occasionally it makes its way through the sacro-ischiatic foramen, and assumes rather the appearance of a fistula in ano. When the matter gravitates into the thigh, beneath the fascia, Mr. Hunter would have termed it a disease *in*, not *of*, the part. The uneasiness in the loins, and the impulse communicated to the tumour by coughing, evince, that the disease arises in the lumbar region; but, it must be confessed, that we can hardly ever know the existence of the disorder, before the tumour, by presenting itself externally, leads us to such information. The lumbar abscess is sometimes connected with diseased vertebræ, which may either be a cause, or an effect, of the collection of matter.—The disease, however, is frequently unattended with this complication.

The disease of the spine, we may infer, is not of the same nature as that treated of by Pott, as there is usually no paralysis. When the bodies of patients with lumbar abscesses are opened, it is found, that the matter is completely enclosed in a cyst, which, in many cases, is of course very extensive. If the contents of such abscesses were not circumscribed by a membranous boundary in this manner, we should have them spreading among the cells of the cellular substance, just like the water in anasarca. The cysts are both secreting and absorbing surfaces, as is proved by the great quantity of matter, which soon collects again after the abscess has been emptied, and by the occasional disappearance of large palpable collections of matter of this kind, either spontaneously, or in consequence of means which are known to operate by exciting the action of the absorbents. In short, the cyst becomes the suppurating surface, and suppuration is now well ascertained to be a process, similar to glandular secretion. While the abscess remains unopened, its contents are always undergoing a change; fresh matter is continually forming, and a portion of what was previously in the cyst is undergoing the necessary removal by the absorbents. This is not peculiar to lumbar abscesses; it is common to all, both chronic and acute, buboes and suppurations in general. It is true, that, in acute abscesses, there often has not been time for the formation of so distinct a membrane as the cyst of a large chronic abscess; but their matter is equally circumscribed by the cavities of the cellular substance being filled with a dense coagulating lymph; and though it generally soon makes its way to the surface, it also is occasionally absorbed.

The best modern surgeons make it a common maxim to open very few acute abscesses; for the matter naturally tends with great celerity to the surface of the body, where ulceration allows it to escape spontaneously; after which, the case generally goes on better, than if it had been opened by art. But, in chronic abscesses, the matter has not that strong tendency to make its way outward; its quantity is continually increasing; the cyst is, of course, incessantly growing larger and larger; in short, the matter, from one ounce, often gradually increases to the quantity of a gallon. When the disease is at length opened, or bursts by ulceration, the surface of the cyst, irritated by the change, inflames; and its great extent, in this circumstance, is enough to account for the terrible constitutional disorder, and fatal consequences, which too frequently soon follow the evacuation of the contents of such an abscess. Hence, in cases of chronic suppurations of every kind, and not merely in lumbar abscesses, it is the surgeon's duty to observe the opposite rule to that applicable to acute cases; and he is called upon to open the collection of matter, as soon as he is aware of its existence, and its situation will allow it to be done.

Certainly, it would be highly advantageous to have some means of ascertaining whether the vertebræ are also diseased; for, as in this instance, the morbid bones would keep up suppuration, until their affection had ceased, and there would be no reasonable hope of curing the abscess sooner, it might be better to avoid puncturing it under such circumstances. The propriety of this conduct seems the more obvious, as issues, which are the means most likely to stop and remove the disease of the spine, are also such as afford most chance of bringing about the absorption of the abscess itself. However, if the collection cannot be prevented from discharging itself, and ulceration is at hand, it is best to meet the danger, make an opening with the lancet, in a place at some distance from where the pointing threatens, and afterward heal it, in the way which will be presently detailed.

Though we have praised the prudence of opening all chronic abscesses while small, the deep situation of the lumbar one, and the degree of doubt always involving its early state, unfortunately prevent us from taking this beneficial step in the present case. But still the principle is equally praiseworthy, and should urge us to open the tumour as soon as the fluctuation of the matter is distinct, and the nature of the case is evident. For this purpose, Mr. Abernethy employs an abscess lancet, which will make an opening large enough for the discharge of those flaky substances so frequently found blended with the matter of lumbar abscesses, and by some conceived to be an emblem of the disease being scrofulous. Such flakes seem to consist of a part of the coagulating matter of the blood, and are very commonly secreted by the peculiar cysts of scrofulous abscesses. The puncture must also be of a certain size, in order to allow the clots of blood, occasionally mixed with the matter, to escape. Mr. Abernethy considers the opening of a lumbar abscess a very delicate operation. Former surgeons used to make large openings in these cases; let out the contents; leave the wound open: the usual consequences of which were, great irritation and inflammation of the cyst; immense disturbance of the constitution; putrefaction of the contents of the abscess, in consequence of the entrance of air into its cavity; and, too often, death. While such practice prevailed, very few, afflicted with lumbar abscesses, were fortunate enough to escape. The same alarming effects resulted from allowing the abscess to attain its utmost magnitude, and then burst by ulceration. If then a more happy train of events depend upon the manner, in which lumbar abscesses are punctured, the operation is certainly a matter of great delicacy.

Until the collection is opened, or bursts, the patient's health is usually little, or not at all impaired; indeed, we see in the faces of many persons with such abscesses, what is usually understood by the picture of health. Hence, how likely our professional conduct is to be arraigned, when great changes for the worse, and even death occur very soon after we have let out the matter, seemingly, and truly, in consequence of the operation. Every plan, therefore, which is most likely to prevent these alarming effects, is entitled to infinite praise; and such, I conceive, is the practice recommended by Mr. Abernethy.

This gentleman's method is to let out the matter, and heal the wound immediately afterward by the first intention. He justly condemns all introductions of probes, and other instruments, which only irritate the edges of the puncture, and render them unlikely to grow together again. The wound is to be carefully closed with sticking plaster, and it will almost always heal.

These proceedings do not put a stop to the secretion of matter within the cavity of the abscess. Of course, a fresh accumulation takes place; but, it is obvious that the matter, as fast as it is produced, will gravitate to the lowest part of the cyst, and, consequently, the upper part will remain for a certain time undistended, and have an opportunity of contracting.

When a certain quantity of matter has again accumulated, and presents itself in the groin, or elsewhere, which may be in about a fortnight after the first puncture, the abscess is to be punctured again, in the same manner as before, and the wound healed in the same way. The quantity of matter will now be found much less, than what was at first discharged. Thus the abscess is to be repeatedly punctured at intervals, and the wounds as regularly healed by the first intention, by which method, irritation and inflammation of the cyst will not be induced, the cavity of the matter will never be allowed to become distended, and it will be rendered smaller and smaller, till the cure is complete.

In a few instances, the surgeon may, perhaps, be unable to persevere in healing the repeated punctures which it may be necessary to make; but, after succeeding once or twice, the cyst will probably have had sufficient opportunity to contract so much, that its surface will not now be of alarming extent. It is also a fact, that the cyst loses its irritability and becomes more indolent, and less apt to inflame, after the contents have been once or twice evacuated, in the above way. Its disposition to absorb becomes also stronger.

The knowledge of the fact, that the cysts of all abscesses are absorbing surfaces, should lead us never to neglect other means, which Mr. Abernethy suggests, as likely to promote the dispersion of the abscess, by quickening the action of the absorbents. Blisters kept open with savine cerate, issues, electricity, occasional vomits of the sulphate of zinc, are the means most conducive to this object. When the vertebræ are diseased, issues are doubly indicated.

In the latter complication, the case is always dangerous. If an opening be made in the abscess, the cyst is at first more likely to be irritated, than when the bones are not diseased, and the affection of the spine is rendered much less likely to undergo any improvement, in consequence of the mere formation of an outward communication. The same bad effect attends necrosis; in which case, the absorption of the dead bone is always retarded by the presence of unhealed fistulæ and sores, which lead down to the disease.

Mr. Crowther succeeded in dispersing some large lumbar abscesses without opening them. Large blisters, applied to the integuments covering the swelling, and kept open with the savine cerate, effected the cure. When this gentleman punctured such collections of matter, he used a small trocar, which he introduced at the same place as often as necessary. He observes, that the aperture so made does not ulcerate, and allows no matter to escape after being dressed. I cannot, however, discover any reason for his preferring the trocar to the abscess lancet, except that the cannula enables the surgeon to push back with a probe any flakes of lymph, &c. which may obstruct its inner orifice. But, this is scarcely a reason, when Mr. Abernethy informs us, that the opening, made with an abscess lancet, is large enough to allow such flakes to be discharged; and when they stop up the aperture, a probe might also be employed to push them back. A wound made with a cutting instrument will, *cæteris paribus*, always unite more certainly by the first intention, than one made with such an instrument as a trocar. Mr. Crowther may always have succeeded in healing the aperture; but, I do not believe, that other practitioners would experience equal success. Were the tumour not very prominent, from the quantity of matter being small, suddenly plunging in a trocar might even endanger parts, which should, on no account, be injured.

Some writers recommend opening lumbar abscesses with a seton. The matter being made to form as prominent a swelling as possible, by pressing the abdomen, and putting the patient in a position, which will make the contents of the abscess gravitate towards the part where the seton is to be introduced, a transverse cut is first to be made in the integuments down to the fascia. A flat trocar is next to be introduced within the incision, which should only be just large enough to allow the instrument to pass freely up under the skin, for at least three quarters of an inch; when the hand is to be raised, and the trocar pushed obliquely and gently upwards, till the cannula is within the lower part of the sac. The trocar must now be withdrawn, and the matter allowed to flow out gently, stopping it every now and then for some minutes. The assistant must now withdraw his hand, to take away the pressure, and the thumb of his left hand upon the opening of the cannula, holding it between his fore and middle fingers. It must then be pushed upward, nearly to the top of the tumour, where its end may be distinctly felt with the fore-finger of the right hand. As soon as it can be plainly felt, it must be held steadily in the same position, and the trocar is to be introduced into it again, and pushed through the skin, at the place where it is felt, and the cannula along with it. The trocar being next withdrawn, a probe with a skein of fine soft silk, dipped in oil, must be passed through the cannula, which being now taken away, leaves the seton in its place. A pledget of mild ointment is then to be applied over the two openings, the more completely to exclude the air. A fresh piece of the silk is to be drawn into the abscess, and that which was in before cut off, as often as necessary. (See *Latta's System of Surgery, Vol.* 3, *p.* 307.)

Mr. Crowther states, that Deckers, who wrote in 1696, discharged a large abscess, in a gradual manner, with a trocar, the cannula of which was not withdrawn, but was stopped up with a cork, and the latter let out at intervals. B. Bell also advises the cannula not to be taken out.

I cannot quit this subject without mentioning a remarkable case of lumbar abscess, which I once saw in Christ's Hospital, under the care of the late Mr. Ramsden. The tumour extended from the ilium and sacrum below, as high up as the ribs. The diameter of the swelling from behind forward, might be about six or eight inches. It was attended with so strong a pulsation, corresponding with that of the arteries, that several eminent surgeons in this city considered the case as an aneurism of the aorta. After some weeks, as the tumour increased in size, the throbbing of the whole swelling gradually became fainter and fainter, and at length, could not be felt at all. The tumour was nearly on the point of bursting. Mr. Ramsden suspected that it was an abscess, and determined to make a small puncture in it. The experiment verified the accuracy of his opinion; a large quantity of pus was evacuated at intervals; but the boy's health suffering, he went to his friends at Newbury, and I did not afterward hear the event. I have never seen any popliteal aneurism, whose pulsations could be more plainly seen, and strongly felt, than those of the abscess we have just been describing. A singular case is related by Mr. Wilmot of a psoas abscess, the matter of which was at length absorbed, and its cavity filled with air, attended with a considerable increase in the size of the tumour, a conical elongated shape, and elastic feel, instead of a fluctuation, previously quite evident, and the subsidence of all the hectical symptoms. A complete dispersion of the swelling was effected by a bandage and compress wet with a strong decoction of oak bark and alum. (See *Trans. of the King's and Queen's College of Physicians in Ireland, Vol.* 2, *p.* 26, *&c.* 8*vo. Dublin,* 1818. *F. Schoenmezel, Obs. de Musculis Psoa et Iliaco suppuratis, Frank. Del. Op. V. R. Beckwith de Morbo Psoadico. Edinb.* 1784. *Abernethy's Surgical and Physiological Essays, Part* 1 *and* 2. *Crowther's Observations on White-Swelling, &c.* 1808. *Latta's System of Surgery, Vol.* 3. *Callisen's Systema Chirurgiæ Hodiernæ, Vol.* 1, *p.* 370. *Pearson's Principles of Surgery, p.* 102, *Edit.* 2. *Richter's Anfangsgrunde der Wundarzneykunst, B.* 5, 113, *Göttingen,* 1801.)

LUNAR CAUSTIC. (See *Argentum nitratum.*)

LUPUS. See *Noli me tangere.*

LUXATION. See *Dislocation.*

M.

MAMMA, REMOVAL OF. The operation of cutting away a diseased breast, is done nearly in the same manner as the removal of tumours in general, and is indicated whenever the part is affected with an incurable disease, which admits, however, of being entirely removed with the knife. When the breast is affected with scirrhus, or ulcerated cancer, the imprudence of tampering with the disease cannot be too severely censured. Were the disorder unattended with a continual tendency to increase, some time might properly be dedicated to the trial of the internal remedies, and external applications, which have acquired any character for doing good in these unpromising cases. But, unfortunately, by endeavouring to cure the disease by medicine, we only afford time for it to increase in magnitude, and, at length, attain a condition, in which even the knife cannot be employed so as to take away the whole of the diseased parts. When the case is marked by the characteristic features of scirrhus, noticed in the article *Cancer*, the sooner the tumour is cut out, the better. There are also some malignant kinds of sarcoma, to which the female breast is subject, (as will be explained in the article *Tumour*,) which cannot be removed at too early a period after their nature is suspected, or known. Indeed, though there is not equal urgency for the operation when the tumour is only an indolent, simple, fatty, or sarcomatous disease, yet as all these tumours are continually growing larger, and little success attends the attempt to disperse them, the practitioner should never devote much time to the trial of unavailing medicines and applications, and let the swelling attain a size, which would require a formidable operation for its excision. Besides, many simple, fleshy, indolent tumours, are accompanied with a certain degree of hazard of changing into very malignant forms of disease.

It is not meant to be denied, however, there are many swellings and indurations of the breast, which it would be highly injudicious and unnecessary to extirpate, because they generally admit of being discussed. Such are many tumours, which are called *scrofulous*, from their affecting patients of this peculiar constitution; such are nearly all those indurations which remain after a sudden and general inflammatory enlargement of the mamma; such are most other tumours, which acquire their full size in a few days, attended with pain, redness, &c.; and, of this kind, also, are the hardnesses in the breast, occasioned by the mammary abscess.

In the removal of all malignant or cancerous tumours, their nature makes it necessary to observe one important caution in the operation, viz. not to rest satisfied with cutting away the tumours just at their circumference; but to take away also a considerable portion of the substance in which they lie, and with which they are surrounded. In cutting out a cancerous breast, if the operator were to be content with merely dissecting out the disease, just where his eyes and fingers might equally lead him to suppose its boundary to be situated, there would still be left behind white diseased bands, which radiate from the tumour into the surrounding fat, and which would inevitably occasion a relapse. In a vast proportion of the cases also, in which cancer of the breast unfortunately recurs after the operation, it is found that the skin is the part, in which the disease makes its reappearance. Hence the great prudence of taking away a good deal of it in every case suspected to be a truly scirrhous or cancerous disease. This may also be done so as not to prevent the important objects of uniting the wound by the first intention, and covering the whole of its surface with sound integuments. So frequently does cancer recur in the nipple, whenever it does recur any where, that many of the best modern operators always make a point of removing this part in every instance, in which it is judged expedient to take away any portion of the skin at all. The surgeon, indeed, would be inexcusable, were he to neglect to take away such portion of the integuments covering scirrhous tumours, as is evidently affected, appearing to be discoloured, puckered, and closely attached to the diseased lump beneath. Nor should any gland, in the axilla, at all diseased, nor any fibres of the pectoral muscle, in the same state, be ever left behind. There is no doubt, that nothing has stamped operations for cancers with disrepute, so much as the neglect to make a free removal of the skin, and parts surrounding every side of the tumour. Hence, the disease has frequently appeared to recur, when, in fact, it has never been thoroughly extirpated; the disease, though entirely a local affection, has been deemed a constitutional one; and the operation frequently rejected as ineffectual and useless.

But, strongly as I have urged the prudence, the necessity of making a free removal of the skin covering, and of the parts surrounding, every cancerous or malignant tumour, the same plan may certainly be regarded as unnecessary, and therefore, unscientific, in most operations for the removal of simple, fatty, fleshy, or encysted tumours, to which the breast and almost every other part are liable. However, even in the latter cases, when the swelling is very large, it is better to take away a portion of skin; for, otherwise, after the excision of the tumour, there would be a redundance of integuments, the cavity of which would only serve for the lodgment of matter. The loose superfluous skin also would lie in folds, and not apply itself evenly to the parts beneath, so as to unite favourably by the first intention; nor could the line of the cicatrix itself be arranged with such nice evenness as it might be, were a part of the redundant skin taken away at the time of operating.

The best method of removing a diseased breast is as follows: The patient is usually placed in a sitting posture, well supported by pillows and assistants; but the operator will find it equally convenient, if not more so, to remove the tumour with his patient in a recumbent position; and this posture is best whenever the operation is likely to be long, or much blood to be lost, which circumstances are very apt to bring on fainting. I remember that Mr. Abernethy, in his lectures, used to recommend the latter plan; which, however, without the sanction of any great name, or authority, possesses such obvious advantages, as will always entitle it to approbation.

The arms should be confined back, by placing a stick between them and the body, by which means, the fibres of the great pectoral muscle will be kept on the stretch, a state most favourable for the dissection of the tumour off its surface. The stick also prevents the patient from moving her arm about, and interrupting the progress of the operation.

When the tumour is not large, and only a simple sarcoma, free from malignancy, it will be quite unnecessary to remove any of the skin, and, of course, this need only be divided by one incision, of a length proportionate to the tumour. The cut must be made with a common dissecting knife; and as the division of the parts is chiefly accomplished with the part of the edge towards the point, the instrument will be found to do its office best when the extremity of the edge is made of a convex shape, and this part of the blade is turned a little back, in the way in which dissecting knives are now often constructed. The direction of the incision through the skin should be made according to the greatest diameter of the tumour to be removed, by which means it will be most easily dissected out.

The direction of the incision is various with different practitioners; some making it perpendicular, others transverse. In general, the shape of the tumour must determine which is the best. In France, it has been said, that when the incision follows the second direction, it heals more expeditiously, because the skin is more extensible from above downward, than laterally, particularly towards the sternum, and consequently allows the sides of the wound the more readily to be placed in contact; and that the action of the pectoral muscle tends to separate the edges of the wound when it is perpendicular. On the other hand, it is allowed that the wound, made in the latter manner, is the most favourable for the escape of the discharge, if suppuration should occur. (See *Œuvres de Desault par Bichat*, p. 312, *T.* 2.)

The cut through the skin should always be somewhat longer than the tumour; and as it is perhaps, the most painful part of the operation, and one attended with no danger whatever, it should be executed with the utmost celerity, pain being more or less dreaded, according to its duration, as well as its degree. The fear, however, of giving pain, has probably led many operators to err, in not making their first incision through the integuments large enough, the consequence of which has often been that there was not sufficient room for the dissection of the tumour with facility; the patient has been kept nearly an hour in the operating room, instead of five minutes, and the surgeon censured by the spectators, as awkward and tedious. It is clear also, that, besides the great deal more blood lost, from this error, than would otherwise happen, the vessels being commonly not tied till all the cutting is finished, the avoidance of pain, that fear, which led to the blunder, is not effected, and the patient suffers much more, and for a much longer time, in consequence of the embarrassment and obstacles in the way of the whole operation.

When the disease is of a scirrhous or malignant nature, the skin covering the tumour should at all events, be in part removed. As I have said before, all that portion which is discoloured, puckered, tuberculated, or otherwise altered, should be taken away. Some must also be removed, in order to prevent a redundance, in all cases in which the tumour is large. We have said too, that in cases of scirrhus and cancer of the breast, the nipple is considered a dangerous part to be left behind. For the purpose of removing the necessary portion of skin, the surgeon must obviously pursue a different mode from that above described; and instead of one straight incision, he is to make two semicircular cuts, one immediately after the other, and which are to meet at their extremities. The size of these wounds must be determined by that of the disease to be removed, and by the quantity of skin, which it is deemed prudent to take away; for the part, which is included in the two semicircular cuts, is that which is not to be separated from the upper surface of the swelling, but taken away with it. The shape of the two cuts together may approach that either of a circle or oval, as the figure of the tumour itself may indicate, as most convenient. The direction of the incisions is to be regulated by the same consideration.

In the above ways, the first division of the integuments is to be made in removing tumours of every description, covered with skin. The same principles and practice should prevail in all these operations; and, whether the swelling is the mamma, or any other diseased mass, whether situated on the chest, the back, the head, or extremities, the same considerations should always guide the operator's hand.

The incision, or incisions, in the skin having been made, the next object is to detach every side of the tumour from its connexions, and the separation of its base will then be the last and only thing remaining to be done. When the tumour is a scirrhus, or other malignant disease, the operator must not dissect close to the swelling, but make his incisions on each side, at a prudent distance from it, so as to be sure to remove, with the diseased mass, every atom of morbid mischief in its vicinity. But when the tumour is only a mere fatty, or other mass, perfectly free from malignancy, the cellular bands and vessels forming its connexions, may be divided close to its circumference. It is astonishing with what ease fatty tumours are removed, after the necessary division is made in the skin; they may almost be turned out with the fingers, without any cutting at all. When they have been inflamed, however, they are then more adherent to the surrounding parts.

Thus we see, that the first stage of the operation of removing a tumour, is the division of the skin; the second, the separation of the swelling from the surrounding parts on every side; the third and last stage is the division of the parts to which its under surface, or base, is attached. The latter object should be accomplished by cutting regularly from above downward, till every part is divided.

It is a common thing to see many operators constantly embarrassed and confused, whenever they have to remove a large tumour, on account of their having no particular method in their proceedings. They first cut a few fibres on one side, then on another; and, turning the mass of disease now to this side, now to that, without any fixed design, they both prolong the operation very tediously, and present to the bystanders a complete specimen of surgical awkwardness. On the contrary, when the practitioner divides the cutting part of the operation into the three methodical stages above recommended, in each of which there is a distinct object to be fulfilled, he proceeds with a confidence of knowing what he is about, and soon effects what is to be done, with equal expedition and adroitness.

Having taken out the tumour, the operator is immediately to tie such large vessels as may be pouring out their blood; indeed, when the removal of the swelling will necessarily occupy more than three or four minutes, it is better to tie all the large arteries as soon as they are divided, and then proceed with their dissection. This was the celebrated Desault's plan, and it is highly deserving of imitation in this country, not only because many subjects cannot afford to lose much blood, but also because the profuse effusion of this fluid keeps the operator from seeing what parts he is dividing.

The largest arteries being tied, the surgeon should not be immediately solicitous about tying every bleeding point which may be observed. Instead of this, let him employ a little while in examining every part of the surface of the wound, in order to ascertain that no portion of the swelling, no hardened lump, nor diseased fibres remain behind.

Even if any part of the surface of the pectoral muscle should present a morbid feel, or appearance, it must on every account be cut away. Also, if any of the axillary glands are diseased, the operator should now proceed to remove them. After the time spent in such measures, many of the small vessels, which bled just after the excision of the swelling, will now have stopped, the necessity for several ligatures will be done away, and, of course, the patient saved a great deal of pain, and more of the wound be likely to heal by the first intention.

Some information may be derived, respecting whether any of the tumour is left behind, by examining its surfaces, when taken out, and observing whether any part of them is cut off; for, if it is, it may always be found in the corresponding part of the wound.

The axillary glands may invariably be taken out without the least risk, if the plan pursued by Desault in France, and the late Sir Charles Blicke, and other eminent surgeons in this country, be adopted. The method alluded to is, after dividing the skin covering the gland, and freeing the indurated part from its lateral connexions, to tie its root, or base, by which it is connected with the parts on the side towards the cavity of the axilla. Then the indurated gland itself may be safely cut off, just above the ligature. Were the gland cut off in the first instance, the artery which supplies it with blood would be exceedingly difficult to tie, on account of its deep situation; and by reason of its shortness and vicinity to the heart, it would bleed almost like a wound of the thoracic artery itself. In this way, there is also not the least hazard of injuring the latter vessel. It would be a great improvement in the mode of operating for the removal of these glands, if surgeons were always to make the patient lie down, with the arm placed in such a position as would let the light fall into the axilla. How much the steps of the operation would be facilitated in this way, I need not attempt to explain.

The above directions will enable a surgeon to remove tumours in general. They apply also in a great measure to *encysted tumours;* but, a few particular rules how to operate in the latter cases, will be found in the article *Tumours.* One half of each ligature is always to be cut off before dressing the wound. The edges of the incision are to be brought together with strips of adhesive plaster; and, before this can be done with ease, the stick confining the arm back must be removed, and the os brachii brought forward, so as to relax the pectoral muscle, and integuments of the breast. No sutures should ever be employed, as they are useless, painful, and irritating. The wound being closed with sticking plaster, and a pledget of simple cerate, a compress of folded linen, or flannel, may be put over the dressings; these are to be secured with a broad piece of linen, which is to encircle the chest, be fastened with pins, or stitches, and kept from slipping down by two tapes, one of which is to go from behind forward, over each shoulder, and be stitched to the upper part of the bandage, both in front and behind. The arm on the same side as that, on which the operation has been done, should be kept perfectly motionless in a sling; for, every motion of the limb must evidently disturb the wound, by putting the great pectoral muscle into action, or rendering its fibres sometimes tense, sometimes relaxed. It is scarcely necessary to say, that, after so considerable an operation as the removal of a large breast, or any other tumour of magnitude, the patient should be given about thirty drops of the tinctura opii. A smaller dose always creates restlessness, headach, and fever, after operations, instead of having the desired effect.

Here it becomes me to state, that as I could not find in any surgical book with which I am acquainted, what I conceived to be a proper description of the mode of removing a diseased breast, and tumours in general, the foregoing remarks are given chiefly on my own authority. Whether they are just, or not, must be decided by the profession.

The removal of a diseased breast rarely proves fatal of itself, unless the parts cut away extend to a considerable depth, and occupy a very large space, or the patient is much reduced before the operation. However, about two years ago, a patient in St. Bartholomew's Hospital died, without any very apparent cause, very soon after being operated upon; and Schmucker has recorded an instance, in which the operation was followed by tetanus. (*Wahrnehmungen, B.* 2, *p.* 80.)

With respect to the average success, following the removal of cancerous diseases, this is a topic, which has been noticed in the article *Cancer.* The statement lately made by Baron Boyer is exceedingly unfavourable; for, in one hundred cases, in which he has removed the diseased parts, only four or five of the patients continued radically cured. (*Traité des Mal. Chir. T.* 7, *p.* 237, 8*vo. Paris,* 1821.)

The principal writers on the removal of the mamma are, Garengeot, Dionis, Le Dran, Bertrandi, Sharp, and Sabatier, in their respective treatises on the operations. B. Bell, Latta, &c. have also treated on the subject in their Systems of Surgery; and there is a memoir *Sur l'Opération du Cancer au Sein,* in *Les Œuvres de Desault par Bichat, T.* 2.

MAMMARY ABSCESS. *Milk Abscess.* With regard to inflammations of the mamma, as my friend, Mr. James has observed, there is "either simple phlegmon, or mammary abscess, which, as it depends upon a peculiarity of state and function, ought to stand alone. Mr. Hey also describes a deep-seated abscess, to which this gland is liable, of rather a chronic character, and is the same, perhaps, as that which Dr. Kirkland has described as the encysted. Dr. K. describes also two others, under the titles of chronic and encysted." Certain cases most frequently occurring in unmarried females, and having very little tendency to suppuration, Mr. James suspects, are the result of inflammation of the glandular part of the breast from disorder in the digestive organs, uterine system, or both. (*On Inflammation, p.* 171.)

Women who suckle are particularly subject to inflammation and suppuration in the breast. The part enlarges, becomes tense, heavy, and painful. The integuments of the breast sometimes assume an uniform redness; sometimes they are only red in particular places. The inflammation may affect the mammary gland itself, or be confined to the skin and surrounding cellular substance. In the latter case, the inflamed part is equally tense; but, when the glandular structure of the breast is also affected, the enlargement is irregular, and seems to consist of one or more large tumours, situated in the substance of the part. The pain often extends to the axillary glands. The secretion of the milk is not always suppressed; when the inflammation is confined to the integuments, and suppuration is said to come on more quickly, than in the affections of the mammary gland itself. When the symptoms of inflammation continue to increase for four or five days, suppuration may be expected; unless the progress of the inflammation be slow, and its degree moderate, in which circumstances, resolution may often be obtained, even as late as a fortnight after the first attack. Inflammations of the breast are almost always attended with symptoms of the sympathetic inflammatory fever. (See *Fevers, Surgical.*) I think authors err, who describe the febrile disorder as generally preceding the local complaint.

Women are most liable to mammary abscesses within the first three months after parturition; but they are also very much exposed to the disorder as long as they continue to suckle.

The most common causes occasioning the mammary abscess, as enumerated by writers in general, are, repressing the secretion of milk at an early period, mental disturbance, fright, &c.; exposure to cold, moving the arms too much while the breasts are very large and distended, bruises, and other external injuries. The causes are not always obvious.

The matter is sometimes contained in one cyst, or cavity; sometimes in several; but the abscess generally breaks near the nipple.

As all inflammations of the mamma are attended with considerable induration, these cases should be carefully distinguished from other swellings of a more incurable kind. It is said, that scrofulous tumours of the mamma, which have existed a long while, often disappear after the occurrence of a milk abscess. Women who have never been pregnant are sometimes affected with suppuration in the breast, supposed by Mr. James, of Exeter, to be connected with uterine, or gastric disorder. Even men are said to be liable to similar complaints.

In the early period of the affection, resolution should be attempted. The following are the principal means for this purpose:—topical blood-letting, saline purges, low diet, keeping the inflamed breast from hanging down, gentle friction of the breast, with a soft sponge, wet with some warm emollient liquor; having the milk tenderly sucked out at proper intervals; saturnine applications, or lotions containing the muriate of ammonia.

When matter cannot be prevented from forming, an emollient poultice is the best application, and the abscess should in general be allowed to break of itself unless of a somewhat chronic nature, in which case it should be opened in a depending part with a lancet. Sinuses sometimes form, in consequence of abscesses in the breast, and will not heal till freely opened with a director and curved bistoury. When the cavity of the abscess begins to fill up with granulations, the poultice may be left off, and superficial dressings applied.

The indurations, often remaining in the breast, in consequence of acute inflammation and abscesses, generally yield to frictions with camphorated mercurial ointment, the application of a piece of soap plaster, and the exhibition of calomel, cicuta, and other alteratives.

Mr. Hey describes a very deep-seated abscess of the breast, not of frequent occurrence, and not confined to pregnant nor suckling women. Its situation renders all superficial applications ineffectual. The inflammatory stage is tedious; and when the matter has made its way outward, the discharge continues, and there is no tendency to healing. Sometimes the matter lodges behind the mamma, as well as in the substance of the gland, and breaks out in different places, the intermediate parts of the breast feeling as if affected with a scirrhous hardness. There are numerous sinuses running in different directions, and, when opened, a soft purple fungus appears within them. The disease goes on in this state for a long while, keeping up hectic symptoms.

Mr. Hey's practice is to trace the course of all the numerous sinuses, and lay them open, and, unless this be done, with respect to every one of them, the cure cannot be accomplished. If he finds any two sinuses running in such directions, that when fully opened, they leave a small part of the mamma in a pendulous state, he removes such part entirely. As the sinuses are filled with fungus, their continuations present no visible cavity, and can only be detected by the greater softness of parts of the wound, where, on breaking down the fungus, the orifice of the collateral sinus may be found. Mr. Hey has found, that even in the most unfavourable subjects the wounds heal quickly, and the natural shape of the breast is preserved.

Consult *Pearson's Principles of Surgery, chap.* 3. *Hey's Practical Observations, p.* 504. *Kirkland has also treated of several kinds of abscesses of the breast, in his Inquiry into the present State of Medical Surgery, Vol.*

2, *p.* 161. *Callisen's Systema Chirurgiæ Hodiernæ, Vol.* 1, *p.* 332. *Gibbons, De Mulierum Mammis et Morbis quibus obnoxiæ sunt,* 8vo. *Edinb.* 1775. *J. Clubbe, Treatise on the Inflammation of the Breasts, peculiar to Lying-in Women, &c.* 8vo. *Ipswich.* 1799. *M. Underwood, Treatise upon Ulcers. &c. and on the Mammary Abscess, &c.* 8vo. *Lond.* 1783. *J. H. James, on the Principles of Inflammation, p.* 171, 8vo. *Lond.* 1821. *Boyer, Traité des Mal. Chir. T.* 7, *p.* 211, *&c.* 8vo. *Paris,* 1821. The German reader may refer to *Richter's Anfangsgr. der Wundarzn. B.* 4, *chap.* 16.

[*MAXILLA INFERIOR. By a reference to the article Osteo Sarcoma, in the Appendix, will be found recorded three instances wherein portions of the lower jaw were extirpated by Professor Mott, of New-York, for the removal of this disease; the carotid artery, in the several instances, having been previously tied.—*Am. Ed.*]

MELICERIS. (from *μελι,* honey, and *κηρος,* wax. A tumour of the encysted kind, filled with a substance resembling wax, or honey, in consistence. (See *Tumours, Encysted.*)

MENINGOPHYLAX. (from *μηνιγξ,* a membrane, and *φυλασσω,* to guard.) An instrument used by the ancients for guarding the dura mater and brain from injury, in their mode of trepanning. It seems to have been something like the lenticular, only its blade was completely round, without an edge. It ended in a lentiform cup, like the latter. (*Encyclopedie Methodique, Partie Chirurgicale.*) Pott gives an engraving of a meningophylax, which resembles a common elevator. (See *Vol.* 1. *of his Works.*)

MERCURY. (*Quicksilver. Mercurius. Hydrargyrus.*) The medicinal virtues of this mineral were almost totally unknown to the ancients, who considered it as a poison. It was first employed for purposes of medicine by the Arabians, who made use of it in the form of ointments for the cure of certain diseases of the skin and the killing of vermin. In modern times, mercury is one of the most important articles of the materia medica; and though perhaps recent investigations will not strictly allow it to be regarded as a specific for the venereal disease, which may be cured by other means, or sometimes even spontaneously, while mercury, so far from being always a certain cure, is sometimes highly detrimental, yet notwithstanding these facts, mercury still retains the character of being generally the most expeditious means of relief. The possibility of curing the venereal disease without mercury, by no means establishes the propriety of abandoning this remedy, any more than its unfitness for certain states of the same disease is a reason for not availing ourselves of its superior utility in others.

Mercury, taken into the stomach in its metallic state, has no action on the body, except what arises from its weight or bulk. It is not poisonous, as was vulgarly supposed, but perfectly inert. But, in its various states of combination, it produces certain sensible effects. It is a powerful and general stimulant, quickening the circulation, and increasing all the secretions and excretions. According to circumstances, the habit of the patient, the temperature in which he is kept, the nature of the preparation, and the quantity in which it is exhibited, its effects are, indeed, various. Sometimes, it more particularly increases one secretion; sometimes another; but its most characteristic effect is the increased flow of saliva, which it generally excites, if given in sufficient quantity. (*Edinb. Dispensatory.*)

From the writings of Theodoric, it appears that mercury was employed in the practice of medicine and surgery as early as the 13th century. But, its use in venereal cases was first mentioned in a tract by Almenar, published in 1516. (See *Thompson's Dispensatory, p.* 205, *Edit.* 2.)

It has been said, that the efficacy of mercury in curing the venereal disease was an accidental discovery; but it seems more probable, that the good effects, which it produced in cutaneous diseases, first led to the trial of it in venereal cases; which being frequently attended with eruptions on the skin, ulcers, &c. seemed to present an analogy to the affections, in which mercury had already been found successful.

In the times, immediately following the origin of the venereal disease, practitioners only ventured to employ this remedy with timorous caution, so that, of several of their formulæ, mercury scarcely composed a fourteenth part, and either on this account, or some difference in the disease itself at that period from what is now remarked, few cures were effected. On the other hand, the empirics, who noticed the little efficacy of these small doses, ran into the opposite extreme, and exhibited mercury in quantities so large, and with such little care, that most of their patients were suddenly attacked with violent salivations, frequently attended with very dangerous, and even fatal symptoms; or such as after making them lose their teeth, left them pale, emaciated, exhausted, and subject, for the rest of their lives, to tremblings, or other more or less dangerous affections. From these two very opposite modes of practice, there originated such uncertainty, respecting what could be expected from mercury, and such fears of the consequences, which might result from its employment, that every plan was eagerly adopted, which offered the least chance of cure, without having recourse to this mineral.

A medicine, however, so powerful, and whose salutary effects had been watched by attentive practitioners amidst all its inconveniences, could not sink into oblivion. After efforts had been made to discover an equally efficacious substitute for it, and it had been seen, how inferior other means were, on which the highest praises had been lavished, the attempts to extend its utility were renewed. A medium was pursued, between the too timid methods of those physicians, who had first administered it, and the inconsiderate boldness of the empiries. Thus the causes, from which both parties failed, were avoided; the character of the medicine was revived in a more durable way, and from this period, its reputation has always been maintained.

The renowned Paracelsus first taught practitioners that mercury might be given internally with safety; for, before he set the example; it had only been externally employed, in three manners. The first was in the form of an ointment or liniment; the second as a plaster; and the third, as a fumigation.

The basis of the ointment, or liniment, was quicksilver, which was blended, by means of trituration, with hog's lard, goose's fat, &c. and composed scarcely one-sixth or one-eighth of the whole; a proportion, however, much greater, than what had been at first employed. But from a fear, that the mineral might prove hurtful to the nerves, by the cold property which they fancied it possessed, and that it might occasion numbness, tremblings, or palsies, they combined with it a multitude of ingredients of a warm, aromatic nature, or supposed to possess such; for example, oil of camomile, sesame-seeds, aniseeds, the roots of zedoary, and the florentine iris, and a thousand other substances, which were incorporated with the ointment. The members, joints, and the whole of the body, except the head, belly, and chest, were rubbed with this composition; and the frictions were repeated, at suitable intervals, until obvious signs of salivation appeared.

The ingredients of the plasters resembled those of the ointments; only they contained less fat, for which was substituted a sufficient quantity of wax, to give them a proper consistence. This composition was applied to the skin, and the whole body was covered with it, excepting the parts on which it was not usual to put ointment. The plasters were kept on, till salivation began.

The fumigations were made with quicksilver, triturated with turpentine, or saliva, or else with cinnabar. These substances were mixed with fatty, or resinous ones, such as myrrh, nutmeg, &c. and, all the ingredients being reduced to powder, were made into a paste, with a sufficient quantity of turpentine, or gum tragacanth. The patient was then placed in a box made on purpose, or under a little kind of tent, out of which the head was generally allowed to protrude. A chafing-dish, containing burning coals, was placed near his feet, and every now and then, bits of mercurial paste were thrown into the vessel. The patient was left exposed to the fumes, which arose, until he broke out into a profuse perspiration, which they took great pains to keep up and increase, by putting him into a warm bed, loading him with bedding, for about two hours, after which he was rubbed quite dry, and given some food. This plan was persisted in every day, till a salivation was produced, which was kept up as long as necessary. The method of fumigation is described by Astruc, and particular preparations, and apparatuses for the purpose, have been since recommended by Lalonette in France, and, more recently, by Abernethy in England.

Of the three methods, which we have just described, only the first is at present much in use, and even this is considerably altered. It was found, not only that mercurial plasters caused heat, redness, itching, and disagreeable eruptions, but, that the method was exceedingly slow and uncertain. Hence, plasters are now only used as topical discutient applications.

Fumigations, considered as the only means of cure, fell also into discredit, because, although they formed a method of applying mercury in a very active manner, they were, as anciently managed, liable to several objections. In this way, it was next to impossible to regulate the quantity of mercury used, which varied according to the greater or lesser activity of the fire, the position of the patient, and other circumstances. The effect of the vapour on the organs of respiration also frequently proved very oppressive; and mercury, applied in the way of fumigation, more frequently occasioned tremblings, palsies, &c. than in any other manner. In Mr. Abernethy's mode, however, fumigation is, under certain circumstances, not only an eligible, but, the very best way of affecting the constitution.

Frictions with ointment have always been regarded as the most efficacious. They have undergone considerable change, and by being rendered more simple, have been greatly perfected. All the warm aromatic substances have been retrenched from the ointment, not only as useless, but as irritating and inflaming to the skin. In modern times, the proportion of mercury to the fat has also been very much increased.

GENERAL REMARKS ON THE ADMINISTRATION OF MERCURY, ITS OCCASIONAL CONSEQUENCES, &c.

With regard to the preparations of the medicine, and the modes of applying it, we are to consider two things; first, the preparation and mode attended with the least trouble or inconvenience to the patient; and secondly, the preparation, and mode of administering it, that most readily conveys the necessary quantity into the constitution. Mercury is carried into the constitution in the same way as other substances, either by being absorbed from the surface of the body, or that of the alimentary canal. It cannot, however, in all cases, be taken into the constitution in both ways; for, sometimes the absorbents of the skin will not readily receive it, at least, no effect is produced, either on the disease or constitution, from this mode of application. In this circumstance, mercury must be given by the mouth, although the plan may be very improper in other respects, and often inconvenient. On the other hand, the internal absorbents sometimes will not take up the medicine, or, at least, no effect is produced on the disease, or the constitution.

In such cases, all the different preparations of the medicine should be tried; for sometimes one succeeds, when another will not. In some cases, mercury seems to have no effect, either applied outwardly, or taken into the stomach. Many surfaces seem to absorb mercury better than others: such are probably all internal surfaces and sores. Thirty grains of calomel, rubbed in on the skin, have not more effect, than three, or four, taken by the mouth. Dressing small ulcers with red precipitate sometimes causes a salivation. (See *Hunter on the Venereal Disease, p.* 335, 336.)

Besides the practicableness of getting the medicine into the constitution in either way, it is proper to consider the easiest for the patient, each mode having its convenience and inconvenience, depending on the nature of the parts to which it is applied, or on certain situations of life at the time. Hence, it should be given in the way most suitable to such circumstances.

In many, the bowels can hardly bear mercury at all, and it should then be given in the mildest form possible, conjoined with such medicines as will lessen or correct its violent local effects, although not its specific ones on the constitution.

When mercury can be thrown into the constitution with propriety by the external method, it is preferable to the internal plan, because the skin is not nearly so essential to life as the stomach, and therefore, is capable in itself of bearing much more than the stomach. The constitution is also less injured. Many courses of mercury would kill the patient, if the medicine were only given internally, because it proves hurtful to the stomach and intestines, when given in any form, or joined with the greatest correctors. Every one, however, has not opportunities of rubbing in mercury, and is therefore obliged, if possible, to take it by the mouth. (*Hunter, p.* 338.)

Mercury has two effects; one as a stimulus on the constitution and particular parts; the other as a specific against a diseased action of the whole body, or of parts. The latter action can only be computed by the disease disappearing.

In giving mercury in the venereal disease, the first attention should be to the quantity, and its visible effects in a given time, which, when brought to a proper pitch, are only to be kept up, and the decline of the disease to be watched; for by this we judge of the invisible, or specific effects of the medicine, and know what variation in the quantity may be necessary. The visible effects of mercury affect, either the whole constitution, or some parts capable of secretion. In the first, it produces universal irritability, making it more susceptible of all impressions. It quickens the pulse, increases its hardness, and occasions a kind of temporary fever. In some constitutions, it operates like a poison; while, in others, it produces a kind of hectic fever, that is, a small quick pulse, loss of appetite, restlessness, want of sleep, and a sallow complexion, with a number of consequent symptoms; but, such effects commonly diminish, on the patient becoming a little accustomed to the medicine. Mercury often produces pains like those of rheumatism, and nodes of a scrofulous nature. (*Hunter, p.* 339, 340.)

The quantity of mercury to be thrown into the constitution, for the cure of any venereal complaint, must be proportioned to the violence of the disease. However, we are to be guided by two circumstances, namely, the time in which any given quantity is to be thrown in, and the effects it has on some parts of the body, as the salivary glands, skin, or intestines. For, mercury may be thrown into the same constitution in very different quantities, so as to produce the same ultimate effect; but the two very different quantities must also be in different times; for instance, one ounce of mercurial ointment, used in two days, will have more effect upon the constitution, than two ounces used in ten. The effects of one ounce, used in two days, on the constitution and diseased parts, are considerable. A small quantity, used quickly, will have equal effects, to those of a large one employed slowly; but, if these effects are principally local, that is, upon the glands of the mouth, the constitution at large not being equally stimulated, the effect upon the diseased parts must be less, which may be known by the local disease not giving way in proportion to the effects of mercury on some particular part. If it is given in very small quantities, and increased gradually, so as to steal insensibly on the constitution, a vast quantity at a time may at length be used, without any visible effect at all. (*Hunter, p.* 341.)

These circumstances being known, mercury becomes a much more efficacious, manageable, and safe medicine, than it was formerly thought to be; but, unluckily, its visible effects upon the mouth and the intestines are sometimes much more violent, than its general effect upon the constitution at large. These parts must therefore not be stimulated so quickly as to hinder the necessary quantity of mercury from being used.

The constitution, or parts, are more susceptible of mercury at first, than afterward. If the mouth is made sore, and allowed to recover, a much greater quantity may be thrown in, a second time, before the same soreness is produced. However, anomalous cases occur, in which, from unknown causes, mercury cannot at one time be made to produce any visible effects; but, afterward, the mouth and intestines are all at once affected. (*Hunter, p.* 342.)

Mercury occasionally attacks the bowels, and causes violent purging, even of blood. This effect is remedied by discontinuing the use of the medicine, and exhibiting opium. At other times, it is suddenly determined to the mouth, and produces inflammation, ulceration, and an excessive flow of saliva. To obtain relief in this circumstance, purgatives, nitre, sulphur, gum-arabic, lime-water, camphor, bark, the sulphuret of potash, blisters, &c. have been advised. Mr. Pearson, however, does not seem to place much confidence in the efficacy of such means, and the mercury being discontinued for a time, he recommends the patient to be freely exposed to a dry cold air, with the occasional use of cathartics, peruvian bark, and mineral acids, and the assiduous application of astringent gargles. "The most material objection, (says Mr. Pearson,) which I foresee against the method of treatment I have recommended, is the hazard to which the patient will be exposed, of having the saliva suddenly checked, and of suffering some other disease, in consequence of it.

"That the hasty suppression of a ptyalism may be followed by serious inconveniences, has been proved by Dr. Silvester, (*Med. Obs. and Inq. Vol.* 3.) who published the cases of three persons, who had been under his own care; two of whom were afflicted with violent pains; and the third scarcely retained any food in her stomach for the space of three months. I have seen not only pains, but even general convulsions produced from the same cause. But, this singular kind of metastasis of the mercurial irritation does not appear to me to owe its appearance to simple exposure to cold and dry air; because I have known it occur in different forms, where patients continued to breathe a warm atmosphere, but used a bath, the water of which was not sufficiently heated. Cold liquids, taken in a large quantity into the stomach, or exposure of the body to cold and moisture, will also prove extremely injurious to those, who are fully under the influence of mercury; whereas breathing a cool air, while the body is properly covered with apparel, has certainly no tendency to produce any distressing, or dangerous consequences.

"If, however, a suppression of the ptyalism should be occasioned by any act of indiscretion, the remedy is easy and certain; it consists only in the quick introduction of mercury into the body, so as to produce a soreness of the gums, with the occasional use of a hot bath." (*Pearson on the Effect of various Articles in the Cure of Lues Venerea, Edit.* 2, *p.* 163, 164.)

Mercury, when it falls on the mouth, produces, in many constitutions, violent inflammation, which sometimes terminates in mortification. In these habits, great caution is necessary. The ordinary operation of mercury does not permanently injure the constitution; but occasionally, the impairment is very material; *mercury may even produce local disease, and retard the cure of chancres, buboes, and certain effects of the lues venerea, after the poison has been destroyed.* (*Hunter, p.* 342)

From mercury occasionally acting on the system, as a poison, quite unconnected with its agency as a remedy, and neither proportionate to the inflammation of the mouth, nor the actual quantity of the mineral absorbed, Mr. Pearson noticed that one, or two patients in general died suddenly every year in the Lock Hospital. The morbid state of the system, which tends to the fatal event, during a mercurial course is named by Mr. Pearson *erethismus*, and is characterized by great depression of strength, a sense of anxiety about the præcordia, irregular action of the heart, frequent sighing, trembling, a small, quick, and sometimes an intermitting pulse, occasional vomiting, a pale contracted countenance, a sense of coldness; but the tongue is seldom furred, and neither the vital, nor natural functions are much disordered. They, who die suddenly of the mercurial erethismus, have frequently been making some little exertion just before. To prevent the dangerous consequences of this state of the system, the use of mercury must be discontinued, whatever may be the stage, extent, or violence of the venereal symptoms. The patient should be directed to expose himself freely to a dry and cool air, in such a manner, as shall be attended with the least fatigue, and he should have a generous diet. In this manner, patients often recover sufficiently in ten or fourteen days, to resume the use of mercury with safety. In the early stage, the mercurial erethismus may often be averted by leaving off the mercury, and giving the mistura camphorata with large doses of ammonia. When the stomach is unaffected, sarsaparilla sometimes does good. (*Pearson, p.* 154, *&c.*)

Occasionally, the use of mercury brings on a peculiar eruption, which has received the several names of *hydrargyria, mercurial rash, eczema mercuriale, eczema rubrum, lepra mercurialis, mercurial disease,* and *erythema mercuriale.*

"Eruptions of various kinds are very common symptoms of syphilis, but a very unusual effect of mercury. Therefore, until the real nature of this erythema was lately discovered, whenever it occurred in patients undergoing a mercurial course for syphilitic complaints, it was naturally enough considered, as an anomalous form of lues venerea. The mercury was consequently pushed to a greater extent, in proportion to the violence of the symptoms, and, from the cause of the disease being thus unconsciously applied for its removal, it could not fail to be aggravated, and hurried on to a fatal termination. The observation of this fact, conjoined with another of less frequent occurrence, namely, that a similar eruption did sometimes appear in patients using mercury for other complaints, and in whom no suspicion of syphilis could be entertained, at last led some judicious practitioners in Dublin to the important discovery, that the eruption was entirely an effect of mercury, and not at all connected with the original disease. This discovery was not published till 1804." (*M'Mullin in Edinburgh Medical and Surgical Journal, No.* 5.) Mr. Pearson states, however, that he has been acquainted with the disease ever since 1781, and has always described its history, and treatment in his lectures, since 1783.

The eruption is attended with more or less indisposition, is not confined to either sex, or any particular constitution, and seems to be equally produced by mercury applied externally, and by any of its preparations taken inwardly. Mr. Pearson has never seen it in subjects above 50; and he says, its occurrence is more common about eight, or ten days after beginning a mercurial course. (*P.* 166.)

Dr. M'Mullin has described three distinct stages of the erythema mercuriale. "The first stage commences with languor, lassitude, and cold shiverings; these symptoms are succeeded by increased temperature of the body, quick pulse, nausea, headach, and thirst. The patient is troubled with a dry cough, and complains of difficult respiration, anxiety, and sense of stricture about the præcordia. The tongue is usually moist, and covered with a white glutinous slime: it sometimes appears clean, and brightly red in the centre, whilst the margins remain foul. The skin feels unusually hot and itchy, with a sense of prickling, not unlike the sensation experienced from the application of nettles. The belly is generally costive; but a diarrhœa is often produced by very slight causes.

"On the first, or second day, an eruption most commonly shows itself, the colour of which is either dark or bright red: the papulæ are at first distinct and elevated, resembling very much those in rubeola. Sometimes, but rarely, the eruption appears like urticaria, and in such instances the disease is observed to be very mild. The papulæ very speedily run together in such a manner as to form a suffused redness, which disappears on pressure. In most cases, it begins first on the scrotum, inside of the thighs, fore-arm, or where mercurial friction has been applied, and the integuments of the parts affected become much swoln. There have also been observed instances, where an eruption of a purplish colour, and unaccompanied by papulæ, has diffused itself suddenly over the entire body. This, however, may be considered as uncommon. In every instance, which came under my observation, it was confined at first to a few places, and from thence gradually extended, until the different portions of the eruption had united, and the papulæ were also rough to the feel. But in those cases, which resemble urticaria, a number of minute vesicles, which contain a serous fluid, appear from the commencement, interspersed among the papulæ. Contrary to what happens in most diseases accompanied with cutaneous affections, the febrile symptoms are much aggravated, and continue to increase after the eruption has been completed. The pulse in general beats from 120 to 130 in a minute, the thirst continues urgent, and the patient extremely restless, seldom enjoys quiet sleep. When the eruption has continued in this manner for a certain period, the cuticle begins to peel off in thin, whitish, scurfy exfoliations, not unlike those observed in rubeola. This desquamation has not been attended to by Dr. Moriarty or Mr. Alley, if they have not, by giving the same name to the decrustation which occurs in the last stage, confounded both together. It commences in those places where the eruption first made its appearance, and in this order spreads to other parts. About this period the fauces become sore, the tongue swells, and the eyes appear somewhat inflamed.

"The duration of this stage is very various; sometimes it continues from ten to fourteen days, and, in other cases, it terminates in half that time. When the disease has appeared in its mildest form, the patient recovers immediately after the desquamation, a new cuticle having formed underneath; but, if severe, he has only experienced the smallest part of his sufferings, and the skin now assumes a new appearance, which I have considered as the second stage.

"The skin at this period appears as if studded with innumerable minute vesicles, which are filled with a pellucid fluid. These vesicles may be expected, if the patient, at the close of the first stage, complains of increased itching, and sense of burning heat, in those parts from which the cuticular exfoliations have fallen. They remain sometimes for a day or two, but are most commonly burst, immediately after their formation, by the patient rubbing them, in order to relieve the troublesome itchiness with which these parts are affected. They discharge a serous, acrimonious fluid, which possess such a very disagreeable odour as to induce nausea in the patient himself, and those who approach near his bedside. The odour is so peculiar, that it can easily be recognized by any person who has once experienced it.

"This fluid is poured out most copiously from the scrotum, groin, inside of the thighs, or wherever the skin forms folds, and sebaceous glands are most numerous. The serous discharge from these minute vesicles forms, with the cuticle, an incrustation, which may be considered as the third or last state.

"These crusts are generally very large, and, when detached, retain the figure of the parts from which they have fallen. Their colour is yellowish; but sometimes appears dark and dirty. This period of the disease might be termed, I think, with much propriety, the stage of *decrustation*, in order to distinguish it more fully from the *desquamation*, which has been already noticed. From the use of the two last terms indiscriminately, those who have described the disease have introduced into their descriptions a degree of confusion which has caused its progress not to be well understood. When this stage appears, the fauces become more affected, the eyes intolerant of light, and the tarsi tender, inflamed, and sometimes inverted. The crusts formed on the face, as in other parts of the body, before falling off, divide asunder, so as to leave cracks and fissures, which produce an hideous expression of countenance; and the eyelids are also, from the general swelling of the face, completely closed. The back and hairy scalp are last affected, and, even in very severe cases, these parts are sometimes observed to escape entirely. The patient, whilst in this state, is compelled to desist from every kind of motion, on account of the pain which he experiences on the slightest exertion, and which he describes as if his flesh were cracking. The crusts also fall off in such abundance, that the bed appears as if strewed with the cones of hops. Whilst the eruption is only making its appearance in one place, another part may have arrived at its most advanced form; so that all the different stages of the disease may be present at one time in the same individual. It is attended with typhus through its entire course; but it is very curious to observe, that the appetite for food, in most cases, remains unimpaired, and sometimes is even voracious. This circumstance was particularly remarkable in a patient who laboured under the disease, in its worst form, for the space of three months, in the Royal Infirmary of Edinburgh; for double the usual hospital allowance of food was scarcely sufficient to satisfy his hunger. When the catarrhal symptoms have continued during the progress of the complaint, they are, at this advanced period, particularly aggravated: the anxiety and pain of the breast are also very severe, attended with cough, and bloody expectoration, and the patient always feels languid and dejected. The pulse becomes frequent, feeble, and irregular, the tongue black and parched, and at length diarrhœa, delirium, convulsions, gangrene of the surface of the body, and death, supervene. In its mild form, it only goes through the first stage, and terminates, as we have already stated, in a few days, by a slight desquamation. But, when severe, it is often protracted more than two months, every stage of the eruption continuing proportionably longer; and when, in this manner, it has run its course, it repeatedly breaks out on the new surface, and passes through the same stages." (*M‘Mullin in Edinb. Med. and Surg. Journal, No.* 5.)

With respect to the remote cause, this is the employment of mercury. Dr. M‘Mullin is inclined to believe with Dr. Gregory, that the application of cold to the body, while under the action of mercury, is absolutely necessary, for its production; an opinion strengthened by the constant prevalence of catarrhal symptoms. However, Mr. Pearson thinks, that cold has no concern in bringing on the complaint in patients under the influence of mercury. At the same time it merits particular attention, that the disease is not exclusively occasioned by mercury either in its general, or more partial attacks: it has been observed to follow exposure to cold, and to recur in the same individual, at irregular intervals, without any obvious or adequate cause. (*Bateman's Synopsis, p.* 256, *Ed.* 3; *Rutter in Edin. Med. and Surg. Journ. Vol.* 5, *p.* 143; *Marcet in Med. Chir. Trans. Vol.* 2, *art.* 9.)

In the early stage, Mr. Pearson recommends small doses of antimonial powder, with saline draughts, or the ammonia acetata. A gentle purgative should be given every three or four days, and opium to procure sleep. The latter medicine sometimes does most good, when joined with camphor, or Hoffman's anodyne liquor. Sarsaparilla and bark may be given, when the discharge is no longer ichorous, and the tumefaction has subsided. Vitriolic acid has seemed to give relief. The diet may be light and nutritive, without fermented liquors, however, till the desquamation has somewhat advanced. Frequent use of the warm bath, and often changing the patient's linen and sheets, which soon become stiff and rough with the discharge, afford much benefit. If the warm bath cannot be had, Mr. Pearson advises washing the body very tenderly with warm water-gruel; he also covers parts, from which the cuticle is detached, with a mild cerate, and renews the application twice a day. (*P.* 178.)

Dr. M‘Mullin advises the immediate discontinuance of mercury; the removal of the patient from wards, where this mineral is in use; emetics and diaphoretics; but on account of the very irritable state of the bowels, he says antimonials are hardly admissible, and that when purgatives are indicated, only the mildest ones, such as ol. ricini, sulphate of magnesia, &c. ought to be given. He advises mucilaginous draughts with opium for relieving the soreness of the fauces. In the second stage, the cold infusion of bark with aromatics and opium, or what is more praised, wine, porter, &c. To relieve the ophthalmia tarsi, the unguentum oxidi zinci, and to appease the painful sensation of the skin cracking, the linimentum calcis, which should be liberally applied as soon as crusts appear.

Consult *Essay on a Peculiar Eruptive Disease, arising from the Exhibition of Mercury, by G. Alley, 8vo. Dublin,* 1804; *also Observations on the Hydrargyria, or that Vesicular Disease arising from the Exhibition of Mercury, 4to. Lond.* 1810. *A Description of the Mercurial Lepra, by Dr. Moriarty, 12mo. Dublin,* 1804. *Spens and M‘Mullin, in Edinburgh Med. and Surgical Journal, No.* 1, *and* 5. *Pearson on Lues Venerea, Edit.* 2. *Bateman's Synopsis, p.* 256, *&c. Ed.* 3.

Frictions with Mercurial Ointment.

No metal acts in its pure metallic state; it must first be more or less combined with oxygen. The mercury, contained in the unguentum hydrargyri, becomes in a certain degree oxydated, when triturated for the purpose of blending it with the fat. The metal, however, in mercurial ointment, is in the most simple, and least combined form, of all its preparations, and hence, it not only generally operates with more mildness on the system, but with more specific effect on the disease. Various salts of mercury, when given internally, operate more quickly than mercurial frictions; yet there are many practitioners, who do not like to confide solely in any internal preparations for curing the venereal disease, particularly, when the virus has produced effects in consequence of absorption. We shall only just mention in this part of the work, that rubbing in mercurial ointment is the mode of affecting the system with mercury, which is generally considered to agree best with most constitutions, and to act with most certainty on the venereal disease.

Mercurial Fumigations.

We have mentioned this method, as being one of the most ancient plans of affecting the constitution with mercury, and Lalonette and Abernethy have stated circumstances in its favour, which certainly render it sometimes a very eligible mode. The latter is of opinion, that if the peculiar advantages of mercurial fumigations were generally known to practitioners, they would be much more frequently employed. The advantages of the method consist in its affecting the constitution, when other means have failed, and in producing its effects in a much shorter time than any other mode requires. How desirable this celerity of operation must often be, when venereal ulceration is making great ravages in the palate, throat, &c. it is needless to insist upon. In patients, who have not strength to rub in ointment, and whose bowels will not bear the internal exhibition of mercury, the mode of fumigation may prove of great service.

"In the year 1776, the Chevalier Lalonette, a physician at Paris, laid before the public an account of a new mode of mercurial fumigation, free from the inconveniences of former ones, and which in the space of thirty-five years, he had successfully employed in more than four hundred cases, that had resisted all the ordinary methods of cure. His method consisted in enclosing the patient, previously undressed, in a kind of box resembling a sedan chair, with an opening at the top to let out the head, and another at the bottom, to which was fitted a small grate or furnace, having in it a heated iron for converting the mercurial remedy into fume. The preparation he made use of was a kind of calomel, which by repeated sublimation from iron filings, was so far deprived of its muriatic acid, as to be in part reduced into running quicksilver; and, while it possessed considerable volatility, was perfectly unirritating. Some of this powder, being strewed upon the hot iron placed below, was immediately converted into smoke, which surrounded the patient's body, and after some time settled on his skin in the form of a white and very fine calx of quicksilver: a complete dress, having its inner surface fumigated with the same powder, was then put on.—The remedy being thus generally applied to the mouths of the cutaneous absorbents, soon got admission into the circulating fluids, and the constitution became thereby more speedily affected than by any other process known before." (*Abernethy's Surgical and Physiological Essays, Part* 3.)

As the fumigating powder used by M. Lalonette was very operose, and consequently a very expensive preparation, and appeared to have no advantage over one made by abstracting the muriatic acid from calomel by means of ammonia. Mr. Abernethy has always employed the latter, which is prepared at the hospital in the following manner: Two drachms of liquor ammoniæ are added to six ounces of distilled water, and four ounces of calomel are thrown into this liquor, and shaken up with it; the powder is afterward separated by a filter, and dried.

The powder thus obtained is of a gray colour, and contains a good deal of quicksilver in its metallic state, which of course is extremely volatile, but becomes oxydated when raised into fume, and afterward condensed into a white subtile powder.

In local disease of the joints, such, for instance, as frequently takes place in the knee, and in sarcomatous enlargements of the breast in women, the late Mr. Sharp and Sir C. Blicke were accustomed to direct fumigated stockings, or under-waistcoats, to be worn; by which these complaints were relieved, and the constitutions of the patients affected, without the trouble and unpleasantness arising from the use of the common mercurial ointment. (See *Abernethy's Surgical and Physiological Essays, Part* 3.)

Mr. Pearson procured Lalonette's machine, and made a considerable number of experiments to determine the comparative advantages of this method, and mercurial frictions. He found, that the gums became turgid and tender very quickly, and that the local appearances were sooner removed, than by the other modes of introducing mercury into the system; but that it soon brought on debility, a rapid and premature salivation, and, of course, that the medicine could not be steadily continued. This gentleman concludes, that where checking the progress of the disease suddenly is an object of great moment, where the body is covered with venereal ulcers, or where the eruptions are large and numerous, so that there scarcely remains a surface large enough to absorb the ointment, the vapour of mercury will be advantageous. But he thinks it extremely difficult thus to introduce a sufficient quantity of mercury into the system to secure the patient from a relapse, and therefore the plan by no means eligible as a general practice. The vapour of mercury, he says, is singularly efficacious, when applied to venereal ulcers, fungi, and excrescences; but this plan requires an equal quantity of mercury to be given in other ways, as if the local application itself were not a mercurial one. (*Pearson on Lues Venerea, p.* 145, *&c.*)

For the purpose of fumigating sores, the hydrargyri sulphuretum rubrum is commonly used. Ulcers and excrescences about the pudendum and anus in women are said to be particularly benefited in this way; and in these cases the fumes are most conveniently applied by placing a red-hot heater at the bottom of a night-stool pan, and after sprinkling on it a few grains of the red sulphuret of quicksilver, placing the patient on the stool. On other occasions, a small apparatus, sold at the shops, is used, which enables the surgeon to direct the fumes through a funnel against the ulcer in any situation.

Though mention has just been made of *venereal* excrescences, I am of opinion with Mr. Abernethy, that it is very questionable, whether any are ever really of this nature. I know, that many excrescences and verrucæ about the anus, and parts of generation, diminish and are cured by a course of mercury. This is the only argument in favour of their being venereal; for, when tied, cut off, or made to fall off by stimulating them with pulv. sabinæ, and the subacetate of copper, they are as effectually cured, as if mercury had been given. In the military hospital at Cambray, I remember a man, on whose scrotum there were several warty excrescences of considerable size. Mr. Booty, assistant staff surgeon, prescribed mercury, by which they were certainly cured with surprising expedition. In this particular case, I think the plan of treatment adopted was the best, because on account of the number of excrescences, and the situation of some of them at the lower and back part of the scrotum, it would have been difficult to have treated them altogether by local applications.

PREPARATIONS FOR INTERNAL EXHIBITION.

The acetite of mercury is supposed to be a mild preparation, and was the active ingredient in the celebrated Keyser's pills. In solution it has also been recommended to be applied externally for the removal of some cutaneous affections. It may be made into pills with crum of bread. The dose is from one to five grains every night.

When it is wished to excite a salivation quickly, when mercurial ointment alone will not produce this effect, or cannot be employed, and when fumigations are not convenient nor agreeable, the hydrargyri oxydum rubrum is often prescribed. The common dose is a grain, which may be increased to two, a day. It is apt, however, to disagree with the stomachs and bowels of many patients; an inconvenience sometimes obviated by conjoining the preparation with opium.

At present, the hydrargyrus cum creta is rarely or never prescribed for the cure of the venereal disease. But it is frequently prescribed as a mild alterative for children in doses of from gr. v. to gr. x. twice a day, blended with any viscid substance.

The oxymuriate of mercury (corrosive sublimate) was a medicine highly praised for its antisyphilitic virtues by the celebrated Van Swieten, and, indeed, there is no doubt, that, like other preparations of mercury, it possesses such qualities. It retains great reputation, even now, and, probably, will always do so. However, like the red oxide, it sometimes deranges the stomach and bowels, and from some surgeons does not receive the same degree of confidence, in respect to its power over syphilis, as mercurial frictions. Mr. Pearson remarks, that "when the sublimate is given to cure the primary symptoms of syphilis, it will sometimes succeed; more especially when it produces a considerable degree of soreness of the gums, and the common specific effect of mercury in the animal system. But it will often fail of removing even a recent chancre; and where the symptom has vanished during the administrations of corrosive sublimate, I have known a three month's course of that medicine fail of securing the patient from a constitutional affection. The result of my observations is, that simple mercury, calomel or calcined mercury, are preparations more to be confided in, for the cure of primary symptoms, than corrosive sublimate. The latter will often check the progress of secondary symptoms very conveniently; and I think it is peculiarly efficacious in relieving venereal pains, in healing ulcers of the throat, and in promoting the desquamation of eruptions. Yet, even in these cases, it never confers permanent benefit; for, new symptoms will appear during the use of it; and, on many occasions, it will fail of affording the least advantage to the patient, from first to last. I do sometimes, indeed, employ this preparation in venereal cases; but it is either at the beginning of a mercurial course, to bring the constitution under the influence of mercury at an early period, or during a course of inunction, with the intention of increasing the action of simple mercury. I sometimes, also, prescribe it after the conclusion of a course of frictions, to support the mercurial influence in the habit, in order to guard against the danger of a relapse. But, on no occasion whatever do I think it safe to confide in this preparation singly and uncombined, for the cure of any truly venereal symptom." (*Pearson on Lues Venerea.*)

The dose of oxymuriate is a quarter of a grain.

The following is a common mode of ordering it: ℞. Hydrargyri oxmuriatis gr. 1. Aquæ Nucis Moschatæ ℥ij. Misce. ℥ss. Omni nocte sumenda.

The muriate of mercury (calomel) is not very much used by modern surgeons for the cure of the venereal disease. Sometimes, indeed, it is given in cases of gonorrhœa, both with the view of preserving the constitution from infection, and keeping the bowels regular. It is more extensively given as an alterative, and for the cure of such surgical diseases as require the system to be slightly under the influence of mercury. It generally proves actively purgative, when more than two or three grains are given.

The most simple preparations of mercury have generally been deemed the most effectual in eradicating the venereal disease. The pilulæ hydrargyri are the most simple of the internal formulæ, being merely mercury triturated with mucilaginous or saccharine substances. Next to mercurial frictions, they are, perhaps, most frequently employed for the cure of the incipient form of the venereal disease, that is, while a chancre is the only complaint. They are also very commonly given in all stages of the disease, to aid mercurial frictions in bringing the system under the influence of the specific remedy. Ten grains of the mass, kept for these pills, is the usual dose. When they purge, opium will sometimes prevent this effect. See *Venereal Disease.*

Mercury is employed both constitutionally and locally in numerous surgical cases; for the removal of indolent thickenings and indurations of parts; for the relief of porrigo, herpetic diseases, tetanus, hydrophobia, hydrops articuli, iritis, and a multitude of other affections, which need not here be specified.

MEROCELE. (from *μηρος*, the thigh, and *κηλη*, a tumour.) A femoral or crural hernia. See *Hernia.*

MEZEREON was recommended by Dr. A. Russell for a particular class of venereal symptoms, in the following terms: "The disease, for which I principally recommend the decoction of the mezereon root as a cure, is the venereal node that proceeds from a thickening of the membrane of the bones. In a thickening of the periosteum, from other causes, I have seen very good effects from it: and it is frequently of service in the removal of those nocturnal pains, with which venereal patients are afflicted; though, in this last case, excepting with regard to the pain that is occasioned by the node, I own I have not found its effects so certain, as I at first thought I had reason to believe. I do not find it of service in the cure of any other symptom of the venereal disease. (*Med. Obs. and Inq. Vol.* 3, *p.* 194, 195.) Mr. Pearson, however, asserts, unequivocally, that mezereon has not the power of curing the venereal disease in any one stage, or under any one form, and if the decoction should ever reduce the venereal node, yet there will be a necessity for taking mercury in as large quantity, and for as long a time, as if no mezereon had been exhibited. Cullen found this medicine of use in some cutaneous affections, but, excepting an instance or two of lepra, Mr. Pearson has very seldom found it possessed of medicinal virtue, either in syphilis, or the sequelæ of that disease, scrofula, or cutaneous affections. (*Pearson on Lues Venerea, p.* 55, 59.)

As the *possibility* of curing most forms of the venereal disease, not only without mercury, but without any internal medicines whatever, is now well established, it is difficult to know what degree of importance to attach to observations, declaring certain articles of the materia medica efficient or inefficient in the cure of that disease; because, if it admit of a spontaneous cure, but will not get well when mezereon, or any other particular medicine is exhibited, we are necessarily obliged to suppose, that such medicine is worse than useless.

MODIOLUS. The crown or saw of a trepan.

MOLLITIES OSSIUM. A morbid softness of the bones, which become preternaturally flexible, in consequence either of the inordinate absorption of the phospate of lime, from which their natural solidity is derived, or else of this matter not being duly secreted into their texture. The bones affected become specifically lighter. (*Saillant, Hist. de la Soc. Royale de Méd. T.* 8.) Dr. Bostock made some experiments, with the view of ascertaining the proportion of earthy matter in bones affected with mollities: he examined a dorsal vertebra of a woman whose bones were found soft and flexible after her decease. In one part of the diseased bone, he found, that the quantity of earthy matter only amounted to one-fifth of its weight, and in another, only to one-eighth, while the proportion in healthy bones amounted to more than one half of their whole weight. (See *Med. Chir. Trans. Vol.* 4, *and Wilson on the Bones and Joints, p.* 253.) In rickets, the bones yield and become distorted only by slow degrees, and retain their natural inflexibility; but, in the present disease, they may be at once bent in any direction, and frequently admit of being readily divided with a knife. The mollities ossium is an exceedingly uncommon disease, and its causes are buried in obscurity. It is supposed, however, to depend upon some peculiar state of the constitution, and the individuals, attacked with it, have been remarked to be mostly about, or rather beyond, the middle period of life, (*J. Wilson, Vol. cit. p.* 252.) and generally, if not always, women. (*Neumann in Abhandl. der K. K. Josephs Acad.* 2 *B. p.* 173; *Portal Cours d'Anatomie, T.* 1, *p.* 15.) One instance, however, is reported, in which the patient was a young man seventeen years of age. (*Thommassin, in Journ. de Méd. T.* 43. *p.* 222.) Surgical writers have usually considered mollities and fragilitas ossium as two distinct and different affections. Boyer thinks, however, that this point is by no means well established. He admits, that there have been a few rare instances of mollities, where the bones were completely flexible, without any degree of fragility. But, he contends, that in almost all the cases on record, the fragilitas and mollities have been combined. He regrets that bones, affected with fragility, have never been chymically nor anatomically examined, particularly as there have been persons who, while living, merely betrayed the symptoms of mollities ossium, yet, in whom unsuspected fractures, evidently of long standing, were discovered after death; while other fractures also happened from the slightest causes during the examination of the same bodies. (See *Boyer, Traité des Maladies Chir. T.* 3, *p.* 607—609.) The truth of these observations is well illustrated in the case lately reported by Mr. Wilson. (*On the Bones, &c. p.* 254.) In the present place, I shall merely describe the pure mollities ossium, or that disorder of the bones, in which they become completely flexible, and lose all their natural firmness. And in order to give an idea of the disorder, I shall quote the case of Madame Supiot. In the year 1747 she had a fall which occasioned her to keep her bed for some time, and left great pain and weakness in her loins and lower extremities. In about a year and a half afterward, she began to perceive her left leg particularly affected. Along with this weakness, she had violent pains over her whole body, which increased after a miscarriage, and still more after a natural delivery, in the year 1751. She was now seized with startings, great inquietude, and such violent heats, that she was almost continually in a sweat, and could not bear the least covering even in the coldest weather, and while her pains continually increased, she took notice that her urine precipitated a white sediment. Her pains abated on the appearance of the sediment, but she now observed that her limbs began to bend, and from this time the softness of them gradually increased till her death. In the month of April, 1752, the trunk of the body did not exceed 23 inches in length; the thorax exceedingly ill formed, and the bones of the upper part very much distorted; those of the lower part were very much bent, and the thigh bones became so pliable that her feet might easily be laid on each side of her head. The right side did not, till after some time, become so deformed as the left; but it was surprising to observe the alterations which daily took place, and the different figures assumed by the limbs, in consequence of the increased softness of the bones; so that when the sediment in the urine was considerable, the disease of the bones seemed to be at a stand, increasing considerably when it was suppressed. Besides this, she had violent pains, startings, difficulty of breathing, spitting of blood, and lastly, a fever, with convulsions. She died in the beginning of November, 1752, and, on dissecting her body, the following appearances were observed: 1. The muscles in general were of a very soft and pale consistence, the vastus externus, fascialis, quadriceps, biceps, and external parts of the gracilis, were much shorter than in their natural state, and more firm and tense; while those on the opposite side were much elongated, thin, and very tender; in short, the whole muscular system had suffered more or less, according to the action of the muscles in her lifetime. 2. The bones were entirely dissolved, the periosteum remaining unhurt, so that they exhibited only the form of a cylinder. 3. The heart and large blood-vessels, both veins and arteries, contained large black polypi, of a viscid consistence, and very unlike those usually found in dead bodies.

A case of softness of the bones is related by Mr. Gooch, but considerably different from the above, as it was attended with a remarkable fragility of them before they became soft. It likewise began with pains through the whole body, attended with feverish symptoms; but after some weeks, these pains were confined chiefly to the legs and thighs, and they were not increased by pressure. This fragility of the bones does not appear to have been the case with Madame Supiot. In the month of June, 1749, Mr. Gooch's patient broke her leg in walking from her bed to a chair, and heard the bone snap. No callus, however, formed, though the fracture was instantly reduced, and treated by one of the best surgeons in her part of the country; but instead of this, the bones began to grow flexible, and in a few months, were so from the knee to the ankle. The disease still continued to increase, so that, in a short time, the other leg and thigh were affected in the same manner, after which both legs became œdematous, liable to excoriations, and to discharge a thin yellow ichor. Scorbutic symptoms began to appear in the winter after the leg was broken, and her gums began to bleed. Tonic medicines were exhibited without any success, except that her menstruation became more regular, and her appetite and digestion better than before; but towards the end of her life, her breathing became difficult, the spine distorted, and a pain in the loins took place upon every motion of the vertebræ: and as her limbs were now quite useless, she was obliged to sit upright in bed. At last, the ends of the bones on which she sat, having become also very soft, spread much, and the ends of her fingers and thumbs, by frequent endeavours to raise herself, became also very broad, and the phalanges crooked. The flexibility of the bones gradually increased, and became more general, attended with a wasting of the flesh, and excessive difficulty of breathing. The menstrual flux totally ceased four months before her death; her legs, which were anasarcous, and excoriated almost all over, became erysipelatous; but she retained her senses to the last. She expired suddenly, having talked in a composed manner concerning her miserable situation and approaching end only a few moments before.

On examining the body, she was found to have lost two feet two inches of her natural stature. The heart and lungs appeared sound, but had been much confined, principally by the liver, which was enlarged in an extraordinary degree; it was not, however, scirrhous, nor in any other way diseased. The spleen was very small, and the mesentery had one large scirrhous gland. All the bones, except the teeth, were softened, so that scarcely any of them could resist the knife; but those of the lower extremities were the most dissolved, being changed into a kind of parenchymous substance, like soft dark-coloured liver, without any offensive smell. So completely, indeed, were they decomposed, that the knife met with less resistance in cutting through them than in sound muscular flesh, though some bony lamellæ were here and there to be met with, but as thin as an egg-shell. The most compact bones, and those which contained the greatest quantity of marrow, were the most dissolved; and it was observable, that the dissolution began internally, for the bony laminæ remained here and there on the outside, and nowhere else. The periosteum was rather thicker than ordinary, and the cartilages thinner; but not in a state of dissolution. The bones were found to contain a great quantity of oily matter and little earth. No cause could be assigned for the disease; and in the case of Madame Supiot, the one assigned, viz. that of her eating too much salt, seems totally inadequate to explain the origin of the disorder. All the cases of mollities ossium on record have proved fatal, and no means of cure are yet known.

For additional observations, connected with this subject, refer to *Fragilitas Ossium* and *Rickets*. Boyer and Richerand treat of the mollities ossium, and rickets, as one and the same disease. But, as Mr. Wilson observes, the first differs from rickets, in attacking people of middle age, or rather older, and not particularly children; and it differs also in the change produced in the bones themselves, which, when dried, do not appear as if they had been long steeped in weak acid, with their animal part nearly unchanged; but both the phosphat of lime and the animal matter appear to have been absorbed, so as to leave mere shells, which are also softer than natural bone of the same thickness. Mr. Wilson further informs us, that large cavities are met with in the substance of the bones, and sometimes communicate with the soft parts surrounding them. In some of these cavities is contained oily matter, like boiled marrow; and in others, masses of coagulated blood, and a soft inorganic substance. (*J. Wilson on the Bones, &c. p. 253. Acrel, Diss. Descriptionem et Casus aliquot Osteomalaciæ sistens; Upsal, 1788. Morand in Journ. des Savans, 1792, et Mém. de l'Acad. des Sciences, 1752. Morand, junr. in Mem. de l'Acad. des Sciences, 1764, p. 206. See also T. Lambert, Relation de la Maladie de Bernard d'Armagnac, sur un Ramollissement des Os; Toulouse, 1700. Fernelius, in lib. de abditis rerum causis. Th. Bartholinus, Hist. Anat. Cent. 4. Petit, Histoire de l'Acad. des Sciences, 1722. Hoin, ibid. 1764. Gagliardie, Anatomes Ossium, Romæ, 1789. C. G. Ludwig, Programma, quo observata in sectione Cadaveris Fœmina cujus ossa emollita erant proponit; Lips. 1757. Fries, Dissert. de Emollitione Ossium; Argentor. 1775. Thompson, in Med. Observations and Inquiries, Vol. 5. p. 259. Chirurgical Observations and Cases, by William Bromfield, Vol. 2, p. 50, &c. Boyer, Traite des Maladies Chir. T. 3, p. 607, &c. Paris, 1814. Richerand, Nosogr. Chir. T. 3. p. 142. What these two writers say, however, chiefly relates to rickets. We meet with cases of Mollities Ossium in the Philosophical Transactions; Act. Haffniens.; Ephem. Nat. Cur.; Saviard's Obs. Chir.; the writings of Forestus; Gooch's Chirurgical Works, Vol. 2. p. 393—399. Ed. 1792, &c. James Wilson, Lectures on the Structure and Physiology of the Parts composing the Skeleton; and on the Diseases of the Bones and Joints, p. 252, &c. 8vo. Lond. 1820.*)

MONOCULUS. (from μονος, single, and *oculus*, the eye.) A bandage formerly applied to the fistula lachrymalis, and diseases of the eye. It consists of a single-headed roller three ells long. In order to apply it to the right eye, it is to be held in the hand, and its end in the left, *et vice versa.* This end is to be put on the back of the neck, and one turn of the roller is to be carried round, over the forehead, so as to meet the extremity of the bandage. The roller is then to descend under the ear of the side affected, and to pass obliquely over the cheek underneath the eye, and next over the root of the nose, and opposite the parietal bone, to the nape of the neck. The third turn of the roller is to overlap the second a little: the third the fourth; making what the French call *doloires*; and the application of the bandage is completed by making turns round the head. The use of the monoculus was only to retain dressings. (*Encyclopédie Méthodique; Partie Chir.*)

MORTIFICATION is of two kinds; the one, without inflammation; the other, preceded by it. To this last species of mortification, the terms *inflammatory*, *humid*, or *acute gangrene*, are often applied; while the second, or that which is not preceded by any or much inflammation, has been distinguished by the epithets, *dry* or *chronic*, and sometimes *idiopathic*, when no cause for the origin of the disease can be assigned. According to Mr. Hunter, inflammation is an increased action of that power, which a part naturally possesses; and in healthy inflammations, at least, it is probably attended with an increase of power. In cases, however, which are to terminate in mortification, there is no increase of power; but, on the contrary, a diminution of it. This, when joined to an increased action, becomes a cause of mortification, by destroying the balance, which ought to subsist between the power and action of every part. There are, besides, cases of mortification, preceded by inflammation, which do not arise wholly from that, as a cause: of this kind, are the carbuncle and the slough formed in the small-pox pustule. (*Hunter.*)

The first general division of mortification, therefore, is into two kinds; first, into the *inflammatory*, *humid*, or *acute*; and secondly, into the *dry*, or *chronic*. But the disorder is also subdivided into many species, which are determined by the nature of their particular exciting causes, as will be presently detailed.

However, it is remarked, that acute, or rapid mortifications, are not necessarily humid, as the slough from the application kali purum proves, and the converse also is true in some cases of sphacelus senilis. (*James on Inflammation, p. 96.*) Another modern writer also asserts, that mortification from wounds and external injuries may be either humid, or dry, or of both kinds together, where the circumstances are particular. (*Guthrie on Gunshot Wounds, &c. p. 122, Ed. 2.*) The doctrine also that any case of mortification is entirely without inflammation, has sometimes been deemed questionable; and Mr. James expresses his belief that the disorder is generally preceded by inflammation, and invariably *accompanied* with some degree of it. And, says he, "whether mortification be a consequence of inflammation, or not, it may, perhaps, with reason be considered, as standing in the same relation to inflammation, as adhesion, suppuration, or ulceration: they may all be preceded by a high degree, or it may be scarcely sensible." (*P.* 84, 85.)

When any part of the body loses all motion, sensibility, and natural heat, and becomes of a brown, livid, or black colour, it is said to be affected with *sphacelus*, that is, complete mortification. As long as any sensibility, motion, and warmth, continue, the state of the disorder is termed *gangrene.* This word is here made use of to signify only a degree of sphacelus, or rather the process, by which any local disorder falls into the state of complete mortification. Many authors use both terms synonymously; but it is to be observed, that gangrene does not invariably end in sphacelus; nor is the latter always preceded by the former. (*Richter, Anfangsgr. der Wundarzn. B.* 1, *Kap.* 3.) There are some surgical writers, who make the distinguishing circumstance of sphacelus to be the extension of the disorder to the bones as well as the soft parts. (*Lassus, Pathologie Chir. T.* 1, *p.* 30, *Ed.* 1809.)

At present, however, this last application of the term sphacelus is never made; for, as Mr. Pearson has rightly observed, the distinctions, "which are founded merely upon the parts, that suffer, or upon the profundity, to which the disease has penetrated, seem inadequate and useless." (*Principles of Surgery, p.* 115, *Ed.* 2.) The manner, in which Dr. J. Thomson views the subject, may be considered as coinciding with the general sentiments of the best modern surgeons. "I shall employ the term *gangrene*, (says he) to express that state of mortification, in inflamed parts, which precedes the death of the part; a stage, in which there is a diminution, but not a total destruction of the powers of life; in which the blood appears to circulate through the larger vessels; in which the nerves retain a portion of their sensibility; and in which, perhaps, the part affected may still be supposed to be capable of recovery. The word *sphacelus*, I shall use to denote the complete death, or mortification of a part; that state, in which the powers of life have become extinct; in which the blood ceases to circulate; and in which the sensibility of the nerves is lost, whether the dead, or mortified part has, or has not, become actually putrid, or shown any tendency to separate and fall away from the living and sound parts. Putrefaction, or the spontaneous process, by which animal bodies are decomposed, is an accidental, and not a necessary effect of the state of mortification. It takes place at very different periods, after the death of particular parts; and these periods, it may be remarked, are always regulated, not only by external circumstances, such as the humidity and temperature of the atmosphere, but, also, by the peculiar structure and morbid conditions of the animal texture, or organ, in which the putrefaction occurs. The term sphacelus, has, I know, been employed to express, that a part is not only completely dead, or mortified, but, also, that that part has become putrid, and is in a state of separation from the surrounding and living parts. But, as putrefaction is not a necessary, or immediate consequence of mortification, or partial death in animal bodies, this use of the term sphacelus is obviously improper." (See *Thomson's Lectures on Inflammation, p.* 504.)

The causes of mortification are either internal, or external. It is commonly taught in the medical schools on the continent, that the internal causes probably operate after the manner of a deleterious substance, which being introduced into the circulation, occasions a putrefaction of the fluids. (*Lassus, op. et loc. cit.*)—Boyer also professes a similar notion; (See *Traite des Maladies Chir. T.* 1, *p.* 140.) as well as Larrey in his account of *traumatic* gangrene; a statement, which has drawn forth the criticisms of Mr. Guthrie. The doctrine is supported by no sort of proof, and may be considered as entirely hypothetical, if not decidedly erroneous. There are, indeed, as Boyer has noticed, some spontaneous mortifications, the primitive cause of which is not always well understood: an inflammation, apparently slight, may become gangrenous immediately it has made its appearance. In scorbutic, venereal, and small-pox cases, we have daily instances of this fact. Other internal causes, without any very evident pre-existing disease, sometimes destroy persons, by gangrenous mischief, who are but little advanced in years. (*Saviard, Obs.* 16. *Haller, Disput. Chir. T.* 4, *p.* 551.) Certain poisonous, acrid, caustic substances taken inwardly, or introduced under the skin, may have the same effect, by annihilating the vital action, or destroying the texture of the parts. (*Lassus, Pathologie Chir. T.* 1, *p.* 31.) But, though these observations may all be entirely correct, they by no means justify the conclusion, that the internal causes of mortification ever act like a deleterious matter producing a putrefaction of the fluids. The mortification of the toes and feet so well described by Mr. Pott, is supposed to proceed chiefly from unknown internal causes, though sometimes attended with an ossified state of the arteries.

Another remarkable specimen of mortification from an internal cause, is that originating from eating bread made of bad black wheat, or rye. Besides occurring as an original idiopathic disease, and from obstruction of arteries, chronic, or dry gangrene (observes Dr. Thomson) may be induced by the action of substances taken into the stomach, which seem to produce it as a specific effect in parts remote from the source of the circulation. The most singular example, which we have of this, is in the gangrene produced by the eating of a particular kind of unsound or diseased rye. This species of mortification has been rarely observed in England; but it has been frequently seen on the continent, where it has been repeatedly known to prevail in som districts, where rye forms a principal article of food, as an endemial disease. It occurs, however, in such districts only after wet seasons, in which that grain is affected with a particular disease, well known in France by the name of the *Ergot*, or cockspur rye. In this disease, the grains of rye grow to a large size, acquire a black colour, and have a compact horny consistence. The species of mortification, produced by eating this substance, was first particularly described by Dodard. (See *Journ. des Savans, an.* 1676.) The part affected became at first insensible and cold, and, in the progress of the disorder, dry, hard, and withered. In very malignant cases, there was delirium. Dodard's description of the complaint was very imperfect; but he has mentioned a circumstance, tending strongly to prove, that the disease actually arose from the alleged cause; viz. that fowls, fed with cockspur rye, are killed by it. Saviard informs us, that he saw this disease in the year 1694, at the Hotel Dieu of Orleans. It attacked the upper and lower extremities, which were rendered, in the course of the disorder, as dry as touch-wood, and as emaciated as Egyptian mummies. In 1710, Noel, surgeon to the Hotel Dieu at Orleans, transmitted to the Royal Academy of Sciences at Paris an account of this peculiar mortification. About fifty people, men and children, had come that season into his hospital, with the affliction. According to Noel, the disorder always began in the toes, and extended itself gradually along the foot and leg, till it sometimes rose to the upper part of the thigh. He had never seen any of the female sex affected with it, and had observed only one instance of it in the upper extremities. The Academy received the history of one case, in which the lower extremities were separated from the body in the articulations of the thigh-bones with the acetabula; the first example, (Dr. Thomson believes) of this separation upon record; and it was the occurrence of this, and of similar cases, that probably first suggested the operation of amputation at the hip-joint. (See *Thomson's Lectures on Inflammation, p.* 541.) As Noel's patients did not come under his care, till after the disease had existed some time, he could not describe from his own observation the early symptoms; but the patients had often told him, that the disease generally began in one, or both feet, with pain, redness, and a sensation of heat, as burning as the fire; and that, at the end of some days, these symptoms ceased, as quickly as they had come on, when the extreme sensation of heat, which they had formerly felt, was changed into cold. The part affected (adds Noel) was black, like a piece of charcoal, and as dry as if it had passed through the fire. After some time, a line of separation was formed between the dead and living parts, like that which appears in the separation of a slough produced by the cautery; and the complete separation of the limb was, in many cases, affected by nature alone. In others, Noel was obliged to have recourse to amputation.

This disease appeared in Switzerland in 1709 and 1716, and its symptoms and progress in that country have been accurately described by Langius in a dissertation, entitled, "*Descriptio Morborum ex esu Clavorum Secalinorum.*"

Gassaud, physician in Dauphiny, where this disease appeared also in 1709, states, that many of the patients were affected with swellings of the feet and legs, and of the hands and arms, which degenerated into a gangrene, that penetrated to the bone, and produced a separation of the affected limb. The disorder was attended with different symptoms in different individuals. Some suffered very violent pain, accompanied by an insufferable sensation of heat, although the part affected often felt cold to the touch. In other patients redness, with much swelling, supervened, attended with fever and delirium. Other patients were without any fever, or delirium, though they seemed to suffer equal pain. In some patients, the parts affected became withered, dry, and black, like charcoal. The separation of the dead parts from the living took place with the most excruciating pain, and a sensation resembling that produced by the direct application of fire. This sensation was sometimes intermittent; and, in other instances, it was succeeded by an equally harassing sensation of cold.

According to Bossau, surgeon to the hospital of St. Antoine, in Dauphiny, the cases, which he saw, were not all of the dry kind, the limb sometimes becoming putrid, and maggots being generated. He says that the disease was not infectious, and it attacked indiscriminately men, women, and children.

The degree of fatality caused by this species of mortification seems to have been extremely various. In the Memoirs of the Royal Academy of Sciences for 1748, M. Duhamel mentions, that of 120 persons afflicted, scarcely four or five recovered with their lives. According to Langius, it was equally fatal in Switzerland.

Dr. Thomson believes, that the preceding sort of gangrene has never occurred in this country, excepting, perhaps, the cases recorded by Dr. Charlton Woolaston, in the Phil. Trans. for 1762; and which proceeded from eating unsound wheat, not rye. (See *Lectures on Inflammation, p.* 548.) For further particulars relating to this curious kind of mortification, I must refer the reader to this valuable work.

The external causes of mortification, which are manifest, and act mechanically or chymically, are burns; excessive cold; the application of caustics; the presence of any ichorous, urinary, or fecal matter effused in the cellular substance; violent contusions, such as are produced by gunshot wounds, or bad fractures; the strangulation of a part, as in cases of hernia, or when polypi, or other tumours are tied; a high degree of inflammation; and, lastly, every thing, that has the power of stopping the circulation and nervous energy in parts. (*Lassus, Pathologie Chir. T. 1, p. 34, 35.*)

Inflammation is one of the most frequent occasional causes of mortification. But, as we have already remarked, the death of a part may take place without any well-marked appearance of previous inflammatory disorder; and the latter even when present has frequently less share in the mischief, than other incidental circumstances, and is in reality, only an effect of the very same cause, which produces the sphacelus itself. It is oftentimes a matter of doubt, whether actual inflammation precedes the occurrence or not; for a part, before it mortifies, is in certain instances only affected with pain, and with no degree of preternatural redness. Lastly, when mortification is, unquestionably, preceded by inflammation, there are so many varieties of the disorder depending on incidental causes, that these latter demand more attention than the inflammation. (*Richter, Anfangsgr. B.* 1. *Kap.* 3.)

Mr. James enumerates the following circumstances, as capable of influencing, in a very great degree, the disposition of inflammation to terminate in mortification. 1. The powers of the part, in which the inflammation occurs, being naturally weak, as in fibrous membranes, the scrotum, &c. 2. The remote supply of blood, or nervous energy, as in the lower extremities. 3. Obstruction to the return of blood. 4. To the supply of blood. 5. Disease in the heart or vessels. 6. Debility from age, habits of life, disorder of the digestive organs, or fever. 7. Poor living, foul air, improper food, scurvy, &c. 8. Impairment of organization from external injury. 9. Of the nervous power by poisons. 10. Undue excitement of weakened parts. 11. Depressing remedies. 12. Pressure and tension. 13. Excessive violence of inflammatory action. 14. Peculiar disposition in the constitution. (*James on Inflammation, p.* 102.)

Healthy phlegmonous inflammation seldom ends in mortification, except when it is unusually violent and extensive.

Of all the inflammatory complaints, to which the system is liable, erysipelas is observed most frequently to terminate in gangrene; and whenever phlegmon is, in any degree, conjoined with an erysipelatous affection, which it not unfrequently is, it seems thereby to acquire the same tendency, being more difficult to bring to resolution or suppuration than the true phlegmon, and more apt to run into a mortified state.

The symptoms of mortification from inflammation take place variously, yet generally as follows:—The pain and sympathetic fever suddenly diminish, the part affected becomes soft, and of a livid colour, losing, at the same time, more or less of its natural warmth and sensibility. In some places, the cuticle is detached; while, in other situations, vesicles arise, filled with a clear, or turbid fluid. Such is the state, to which we apply the term *gangrene*, and which stage of the disorder too often rapidly advances to *sphacelus*, when the part becomes a cold, black, fibrous, senseless substance, called in technical language, a *slough*.

It merits notice, however, that, "in cases, in which gangrene immediately succeeds to inflammation, these two morbid states may, in some measure, be regarded as stages, or periods, of the same disease. They pass insensibly into one another; nor is it possible to say precisely where the one state ends, and the other commences. The symptoms of inflammation, in these cases, do not disappear before those of gangrene come on; but seem rather to undergo a gradual and almost imperceptible change, or conversion, into one another. *The redness acquires a deeper tinge, and spreads further,* than formerly; *the swelling increases and becomes more doughy;* and, in this incipient stage, the gangrene, particularly when it attacks the cutaneous texture, often bears a considerable resemblance to erysipelas." (See *Thomson's Lectures on Inflammation, p.* 506.)

It is to be observed, also, that "the part of the body which becomes affected with gangrene, *does not immediately lose its sensibility;* for the pain, on the contrary, is often very much aggravated by the approach of this state. *The blood also still continues to circulate,* at least *in the larger vessels of the part,* but, perhaps, *with less force:* and from the resistance which it meets with in passing through the capillaries, *in less quantity,* than formerly. The serous effusion into the cellular membrane continuing to increase, and the action of the absorbent and sanguiferous vessels to diminish, the part becomes at length incapable of being restored to its former office in the animal economy. It is, therefore, in its earlier stages only, that gangrene is to be considered as an affection admitting of cure; for there are limits, beyond which, if it pass, recovery becomes impossible. These limits it may not, in every instance, be easy to define; but they form the boundaries between incipient gangrene and the ultimate termination of that state in sphacelus." (*Thomson, op. cit. p.* 507.)

The causes which produce mortification by impeding the return of blood from the part affected, for the most part operate by making pressure on the trunk or principal branches of a vein. In these instances, there is always an accumulation of blood in the part which first swells, becomes of a livid colour, tense, and very painful. Soon afterward, blisters arise, and the part becomes soft, œdematous, cold, insensible, emphysematous, black, and fetid. Such are the circumstances which happen in strangulated hernia, in tied polypi, and in a limb in which the veins have been so compressed by any hard swelling, such as the head of a dislocated bone, as to excite mortification.

Other causes operate by preventing the entrance of arterial blood. The application of a ligature to an artery, as practised in several surgical cases, and all external pressure, that closes the artery, or arteries, on which a part entirely depends for its supply of blood, have this effect. Mortification does not, however, always take place when the trunk of an artery is rendered impervious, because nature furnishes the necessary supply of blood through collateral ramifications. But when the disorder does happen, the part commonly first becomes pale, flaccid, and cold, and soon afterward shrinks, loses its sensibility, grows black, and perishes.

It is usually represented by writers, that mortification may proceed from a mere lessening of the communication of blood and nervous energy to a part. However, it is to be observed, that parts, deprived of all connexion with the sensorium, by the division or paralytic state of their nerves, do not frequently perish on this account. But as their functions are carried on with less vigour, and their vitality is weakened, the same causes which sometimes produce mortification in parts differently circumstanced, must much more readily occasion it in them. Among the causes of the present species of mortification, may be mentioned great universal debility; extreme old age; a thickening and ossification of the coats of the arteries, and a consequent diminution of their capacity, and of their muscular and elastic power.

Cowper, the anatomist, was one of the earliest writers who took notice of this ossification of the arteries of the leg, in persons who had died of mortification of the feet and toes. (See *Phil. Trans. Vol.* 23, *p.* 1195, *and Vol.* 24, *p.* 1970.) A similar case was remarked by Mr. Becket, of which he has given an account in his Chirurgical Observations. The occurrence was also mentioned by Naish. (See *Philosoph. Trans. Vol.* 31, *p.* 226.) Dr. J. Thomson has seen one example of a very complete ossification of the arteries of the leg, accompanying a mortification of the feet and toes. (*On Inflammation, p.* 537.) Speaking of the same subject, Mr. Hodgson remarks: "Experience has proved this condition of the arteries to be at least a constant attendant upon one species of gangrene, to which the extremities of old subjects are liable; and I have found the three principal arteries of the leg nearly obliterated by calcareous matter in two fatal cases of this disease. But our knowledge of the power of collateral circulation, in every part of the body, will not allow us to admit the obliteration of the trunks as a sufficient cause of mortification, from a deficient supply of blood. It is therefore necessary for us to remember, that the same disease may probably exist in the collateral branches, upon which it has produced similar effects. But if an extent of vessel be converted into a calcareous cylinder, it loses its elasticity and organic powers, so as to be unable to afford any assistance to the propulsion of the blood; and the existence of parts, supplied by vessels in this state, constitutes a strong argument against the agency of the arteries in the circulation of the blood. The above observations, on the cause of this species of gangrene, at once expose its incurable nature; and this state of the blood-vessels renders the danger of amputation very considerable, unless fortunately the disease in the arteries does not extend to the part at which the ligature is applied." (See *Hodgson's Treatise on the Diseases of the Arteries and Veins, p.* 41.) However, although the ossified state of an artery must certainly be unfavourable to its healing, it does not constantly prevent this desirable event. (See *Case in Medico-Chir. Trans. Vol.* 6, *p.* 193.)

The preceding facts are particularly entitled to attention, because, as we shall presently find, the opinion that the mortification of the toes and feet arose from an ossification of the arteries, was considered by Mr. Pott as destitute of foundation.

It is probable, however, that sometimes other causes are concerned. Fabricius Hildanus mentions a fatal case of mortification of the feet and legs, where the patient was in the vigour of life, and apparently of good constitution. After death, a scirrhous tumour was found surrounding and compressing the inferior vena cava, and aorta, near their bifurcation, so as to prevent the free circulation of the blood in the lower extremities. Mortification of the extremities also sometimes occurs from deficient circulation, in the progress of diseases of the heart.

The mortification, arising from long continuance in the same posture, is chiefly attributable to the unremitted pressure which parts sustain, and which obstructs the circulation. Surgeons have frequent occasion to see melancholy examples of this kind of mortification, particularly in cases of fractures, paralysis from disease of the vertebræ, &c. The mischief most readily occurs where the bones have the least flesh upon them, and, consequently, where all external pressure has the greatest effect; as, for instance, about the os sacrum, os ilium, spines of the scapula, &c. The disordered part always first becomes soft, livid, red at the circumference, and œdematous, afterward losing its sensibility, and acquiring a black appearance: at length it is converted into a foul sloughing ulcer.

Though long continuance in the same posture is the grand cause of this kind of mortification, yet incidental circumstances are frequently combined with it, and have great influence over the disorder. These are, great debility, the same state of the system as exists in typhus fever, impure air, unclean bedding, &c.

There are some causes which produce death in a part at once, by the violence of their operation. A very powerful blow on any portion of the body may destroy the vitality of the fibres and vessels in this sudden manner. Lightning, strong concentrated acids, and gunshot violence, sometimes act in a similar way. When a ball enters the substance of parts with great force and rapidity, many of the fibres, which are in its track, are frequently killed at once, and must be thrown off in [illegible] of sloughs, before the wound can granulate and heal. (See *Hunter on Gunshot Wounds.*)

Cold is often another cause of mortification, and when parts which have been frozen, or frostbitten, are suddenly warmed, they are particularly apt to slough.

I find in Baron Larrey's valuable publication, some interesting observations on the gangrene from cold. He acquaints us, that after the battle of Eylau, one of the most grievous events to which the French soldiers were exposed, was the freezing of their feet, toes, noses, and ears: few of the vanguard escaped the affliction. In some, the mortification was confined to the surface of the integuments of the toes or heels; in some, the skin mortified more deeply, and to a greater or lesser extent; while, in others, the whole of the toes, or foot, was destroyed. (See *Programma quo frigoris acrioris in corpore humano effectus expendit. Haller, Disp. ad Morb. Lips.* 1755.)

"All the writers, on this species of mortification (says Larrey) have considered cold as the determining cause; but, if we attend to the period when the complaint begins its progress, and the phenomena which accompany it, we shall be convinced, that cold is merely the predisposing cause. In fact, during the three or four exceedingly cold days which preceded the battle of Eylau, (the mercury having then fallen to 10, 11, 12, 13, 14, and 15 degrees below zero of Reaumur's thermometer) and until the second day after the battle, not a soldier complained of any symptom depending upon the freezing of parts. Nevertheless, they had passed these days, and a great portion of the nights of the 5th, 6th, 7th, 8th, and 9th of Feb. in the snow, and the most severe frost. The imperial guard especially had remained upon watch in the snow, hardly moving at all for more than four and twenty hours, yet no soldier presented himself at the ambulance,* nor did any one complain of his feet being frozen. In the night of the 9th, and 10th of February, the temperature suddenly rose, the mercury ascending to 3, 4, and 5 degrees above zero. A great quantity of sleet, that fell on the morning of the 10th, was the forerunner of the thaw which took place in the course of that day, and continued in the same degree for several days. From this moment, many soldiers of the guards and the line applied for succour, complaining of acute pain in the feet, and of numbness, heaviness, and prickings in the extremities. The parts were scarcely swollen, and of an obscure red colour. In some cases, a slight redness was perceptible about the base of the toes, and on the back of the foot. In others, the toes were destitute of motion, sensibility, and warmth, being already black, and, as it were, dried. All the patients assured me, that they had not experienced any painful sensation during the severe cold to which they had been exposed on the night-watches of the 5th, 6th, 7th, 8th, and 9th of February, and that it was not till the night of the 10th, when the temperature had risen from 18 to 20 degrees, that they felt the first effects of the cold." It is further noticed by Larrey, that such patients as had opportunities of warming themselves in the town, or at the fires of the night-watches, suffered in the greatest degree. (See *Larrey's Memoires de Chirurgie Militaire, T.* 3, *p.* 60—62.)

Sometimes mortification seems to depend either upon the operation of some infectious principle, or, at all events, upon causes which simultaneously affect numerous individuals; for instances have been known, in which almost all the ulcers and wounds in large hospitals became nearly at the same time affected with gangrenous mischief. (See *Hospital Gangrene.*)

Mortification is very frequently occasioned by the injury which parts sustain from the application of fire and heated substances to them. When the heat is very great, the substance of the body is even decomposed, and of course killed at once. On other occasions, when the heat has not been so violent, nor sufficiently long applied, inflammatory symptoms precede the sloughing.

Cutaneous texture is that in which we have the best opportunity of observing the phenomena and progress of gangrene. When it occurs as a consequence of inflammation, the colour of the skin changes from the florid red to a darker shade; and in the progress of the disease it acquires a livid hue. The cuticle often separates at certain points from the skin, and the vesications, termed *phlyctenæ*, are formed, which usually contain a bloody-coloured serum. As sphacelus comes on, the livid hue disappears, and a slough is formed, which is sometimes ash-coloured; sometimes black. It is not always easy to judge of the extent of mortification from the appearance of the skin; for, when the subjacent cellular membrane is affected, the disorder may occupy a greater extent internally, than upon the surface.

In a spreading gangrene, the red colour of the affected skin is insensibly lost in the surrounding integuments; but, when gangrene, followed by sphacelus stops, a red line, of a colour more lively than that of gangrene, is generally perceptible between the dead and living parts. It is at the inner edge of this inflamed line, where we usually see the ulcerating process begin, by which the separation of the dead from the living parts is affected. (See *Thomson's Lectures on Inflammation, p.* 511, 512.)

Mortification occurs frequently in cellular texture. The skin which covers dead cellular substance, generally has a gangrenous appearance, and afterward either ulcerates, or sloughs. In some cases, the portion of sphacelated cellular texture is small, as in the malignant boil; in others, extensive, as in cases of carbuncle. In erysipelas phlegmonoides, the cellular membrane, connecting together the muscles, tendons, nerves, blood-vessels, &c. often perishes to a great extent. Here large portions of skin are frequently also destroyed by sloughing, or ulceration, so that muscle, blood-vessel, tendon, nerve, &c. are exposed to view, quite denuded of their proper coverings, and in different states of disease.

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* The ambulances of the French army are caravans, furnished with an adequate number of surgeons, and every requsite for the dressing of wounds, and the immediate performance of operations, upon which last circumstance, in particular, the life of the wounded soldier often depends. These caravans follow the most rapid movements of th[illegible]my, and are always capable of keeping up with [illegible]ard.

Artery is the texture, endowed with the greatest power of resisting its own destruction by mortification. "I have (says Dr. Thomson) in various instances of erysipelas phlegmonoides, seen several inches of the femoral artery laid completely bare by the gangrene, ulceration, and sphacelus of the parts covering it, without its giving way before death. The arteries in these, and other similar instances, in which I have seen them laid bare in the neck and arm, by abscess terminating in mortification, had the appearance of raw flesh, and were obviously thicker and more vascular than natural. The blood circulated through them, and assisted in supplying with nourishment the parts upon which they were distributed." (*P.* 513.) I have often seen the truth of the foregoing statement sadly illustrated in cases of sloughing buboes, by which several inches of the femoral artery were exposed. I have seen the throbbing brachial artery denuded for more than a month, nearly its whole extent along the inside of the arm, by the ravages of malignant and pseudo-syphilic ulceration, attended with repeated sloughing; and yet hemorrhage had no share in carrying off the unfortunate patient.

It is a curious fact, that the blood coagulates in the large arteries, which lead to a mortified part. This occurrence takes place for some distance from the slough, and is the reason why the separation of a mortified limb is seldom followed by hemorrhage.

The same occurrence also affords an explanation, why, in the amputation of a mortified limb, there is sometimes no hemorrhage from the vessels, although the incisions are made in the living part. This fact was first particularly pointed out by Petit, the surgeon. (See *Mém. de l'Acad. des Sciences,* 1732.) "When a gangrened limb (says this celebrated surgeon) is cut off in the dead part, no hemorrhage occurs, because the blood is coagulated a great way in the vessels." He adds, "We have several examples of limbs amputated, on account of gangrene, in which no hemorrhage occurred, although the amputation was made a considerable way in the living parts; because the clot was not confined in these cases to the dead part, but was continued forwards into the living as far as the inflammatory disposition extended."

According to Dr. Thomson, cases, in confirmation of the foregoing statement, are recorded by other practical writers, especially Quesnay, and Mr. O'Halloran. In one of the cases, mentioned by the latter gentleman, and in which no hemorrhage followed the removal of the limb, the incisions were made four inches above the division of the dead from the living parts. Dr. Thomson has seen a still longer portion of femoral artery closed up with coagulated blood, after a mortification of the foot and leg; and, in one example, where the mortification began in the thigh, he saw the coagulation of the blood in the external iliac, extending up to the origin of this vessel from the aorta. "So common, indeed, is this coagulation of the blood in the limbs affected with mortification (observes Dr. Thomson,) that it has been supposed to be a necessary and constant effect of this disease. This opinion, however, does not appear to be well founded; for I have now seen several instances in which a limb has mortified and dropped off, without hemorrhage having occurred from the vessels divided by nature: and yet, in examining the vessels of the stumps of these patients after death, I have not been able to find any clots, either of coagulated blood, or of coagulable lymph. In the cases to which I allude, the adhesive inflammation, occurring in the line of separation between the dead and living parts, had extended to the blood-vessels, and their inner surfaces being inflamed and pressed together by the swelling which occurs, had adhered so as to close up their extremities. It is in this way we shall find, that the common ligature acts, which is applied to the divided extremities of arteries and veins; and it is this obliteration, by the process of adhesion of the extremities of the arteries and veins in the neighbourhood of the sphacelated parts, that in reality prevents the occurrence of hemorrhage, when the mortified limbs fall off, or are removed by the knife. The coagulation of the blood in the canal of the vessel is not alone sufficient. It may tend, in the cases in which it occurs, for a time to restrain hemorrhage; but it is by the obliteration by adhesion, of the canal in the extremities of the arteries and veins, that the occurrence of hemorrhage can be securely and permanently provided against. Indeed, to me it seems doubtful, whether that coagulation of blood, which takes place in mortified limbs, ever takes place in the canal of the vessel, till its extremity and lateral communications have been plugged up by the coagulating lymph, which is extending during the state of the adhesive inflammation." (See *Thomson's Lectures on Inflammation, p.* 554.)

When gangrene and sphacelus happen to any extent, the patient is usually troubled with an oppressive hiccough; a symptom well known to the surgeon of experience, and often an indication of the mischief, when external signs are less instructive. The truth of this remark is frequently seen in strangulated herniæ.

The constitution also suffers immediately a considerable dejection. The patient's countenance suddenly assumes a wild, cadaverous look; the pulse becomes small, rapid, and sometimes irregular; cold perspirations come on, and the patient is often affected with diarrhœa and delirium.

As Dr. Thomson observes, the constitutional symptoms "form fevers, which partake in individual cases, more or less, of an inflammatory, typhoid, or bilious character. But, the degree of these fevers varies, in every particular case, from their almost total absence to the highest degree of intensity. The skin is usually hot, and dry at the commencement of the attack; the tongue is without moisture, brown and hard; the pulse is quicker, and less full and strong, than in inflammation; and this state of the pulse is often attended by fluttering intermissions, and a considerable degree of subsultus tendinum. The fever has, in general, more of the asthenic, than of the sthenic character; or it is more of the typhoid, than of the inflammatory type; a circumstance of great importance in the constitutional treatment of mortification. The fever in gangrenous affections is often accompanied with great uneasiness and restlessness, dejection of spirits, wildness of the looks; and, in severe cases, with almost always more or less delirium. In the progress of the disease, cold sweats, palpitations, and convulsions, sometimes occur; a hiccough, accompanied with nausea, often comes on, and proves a most distressing symptom to the patient. Frequently, this hiccough is the forerunner of death. Some patients die comatose; others, after suffering severe pain, spasms, and delirium. But, in some, a slow, in others, a sudden abatement of the constitutional symptoms takes place, accompanied also with the amelioration of the local affection. The gangrenous inflammation stops, and a red line is formed by the adhesive inflammation in the extreme verge of the living parts; the dead part separates, and granulations form; and when the constitution has strength to sustain the injury it has received, recovery takes place." (See *Lectures on Inflammation, p.* 509.)

In cases of sphacelus, the prognosis chiefly depends on the nature of the cause of the disorder. The more easy the cause is of removal, the less room is there for alarm. It is an erroneous supposition, that mortification arising from an external local cause is more easy to be stopped and cured, than that originating from an internal cause. The local cause is sometimes exceedingly difficult, or even incapable, of removal; and a sphacelus, which is at first entirely local, may afterward become a general disorder, by the universal debility and derangement of the system, resulting from the complaint. Hence, it is obvious, that a sphacelus may easily extend beyond the bounds of its outward local cause. On the other hand, a mortification may be reduced to one of a nature entirely local; though it arose at first from constitutional causes. Sphacelus from extreme debility, or from such a state of the system, as attends the scurvy, typhoid fevers, &c. is constantly perilous, because these causes are very difficult to remove. It is also a fact, that, when numerous causes are combined, it is an unfavourable occurrence, not merely because the surgeon is apt to overlook some of them, but because there are in reality more obstacles to the cure.

Humid gangrenes, which are frequently accompanied with emphysema of the cellular membrane, usually spread with great rapidity. "Some authors, (says a modern writer,) have attributed this to the influence of the air extricated, and Dr. Kirkland has described emphysematous gangrene, as distinct from the others, and some have imputed this disposition, in a considerable degree, to the putrefaction of the juices, which are effused." With regard to the former, the author has mistaken an effect for a cause; yet, "it is important to recognize the fact, that gangrene, when accompanied with emphysema, has a remarkable disposition to spread." (*James on Inflammation, p.* 96.)

Sometimes a mortification spreads so slowly, that it does not occupy much extent at the end of several months, or even a whole year. The case, however, is often not the less fatal on this account. The danger is never altogether over, until the dead part has completely separated. The entrance of putrid matter into the circulation (says Richter) is so injurious, that patients sometimes perish from this cause, long after the mortification has ceased to spread. (*Anfangsg. der Wundarzn. B* 1, *Kap.* 3, *p.* 78, 79.)

This last circumstance is very much insisted upon, by all the modern continental surgeons; but the doctrine has never gained ground among English surgeons, who entertain little apprehension of the bad effects of the absorption of putrid matter in cases of mortification; and the opinion of Mr. Guthrie may be more correct, that nature receives the shock through the nervous system, and not through the absorbents. (*On Gunshot Wounds, p.* 123, *Ed.* 2.)

The idea of a deleterious principle being absorbed was long ago well refuted by Mr. J. Burns, who pointed out, that the impression upon the constitution was in no degree commensurate with the size of the slough, and consequently with the quantity of putrid matter, as the effects produced by a small slough of intestine, or cornea, will exemplify. But when the sloughs are of equal size, and in the same parts, the differences of constitutional sympathy, as Mr. James observes, may depend upon the nature of the surrounding inflammation, which, however, he conceives, may itself be affected by the quantity of putrid irritating fluids. (*On Inflammation, p.* 98.)

The danger of sphacelus is also proportioned to the size and importance of the part affected. The event of the distemper likewise depends very much on the patient's age and constitution.

Parts, affected with gangrene, do not immediately lose the whole of their sensibility; the circulation is still continued in a certain degree; and when the progress of the distemper does not surpass certain bounds, the functions of such parts may be completely re-established. Gangrene, strictly speaking, is not a decided mortification; but only the forerunner of this latter mischief, and may be regarded as the intermediate link, between the most violent stage of inflammation and sphacelus. The presence of this last implies the total loss of life in the part affected, the destruction of its organization, the abolition of all its functions, and an absolute inability to resume them again. However, even when we see the surface of a part manifestly sphacelated, we must not always conclude, that the entire destruction of its whole substance or thickness is certain; for, in many cases, the disorder only affects the skin and cellular substance. In this state, the integuments frequently slough away, leaving the tendons, muscles, and other organs, perfectly sound.

It is only in external affections of the body that the progress of inflammation to gangrene and sphacelus can be marked with any degree of precision. The approaches of the latter are also not invariably announced by the distinct and manifest symptoms of gangrene, even when the disorder is quite superficial. There are cases, which justify the conclusion, that a small part of the body may be affected with sudden death, just in the same manner as the whole machine. Sphacelus is often seen making its appearance in a part, which is apparently quite healthy, without being preceded by any other symptoms, than a sudden acute pain in the seat of the mischief. Sometimes, in the earliest period of the complaint, a black spot, which rapidly spreads on every side, is the only change that can be observed.

In order to form a just prognosis, all the above circumstances must be taken into consideration, and, in particular, we must never deliver an opinion, without having closely examined the progress of the disorder; for, should we make a favourable prognosis from such appearances as might justify us as much as possible in so doing, there would be great risk of finding ourselves most miserably mistaken by the event of the case. In all cases of considerable mortification, even when arising from an external cause, the patient cannot be deemed exempt from danger, not only while no separation of the mortified parts has begun, but also, not before such parts have been completely detached.

TREATMENT OF MORTIFICATION.

I shall arrange under two heads what is to be said of the treatment of mortification. Under the first will be comprehended every thing, which relates to internal remedies, and such other means, as are indicated by the general state of the system; under the second, topical remedies, and the local treatment of the parts affected.

In the treatment the surgeon will always have one thing for immediate consideration; viz. whether the case before him is one of acute mortification, attended with inflammation and inflammatory fever; or whether it is a chronic mortification, beginning without fever, or attended with a fever of a typhoid nature and great prostration of strength? By making up his mind upon this point, the practitioner will establish an useful general principle for his guidance, especially in the commencement of the treatment.

1. When mortification is acute, and seems to depend on the violence of inflammation, the first indication is to moderate the inordinate action of the sanguiferous system, by the prudent employment of such means as are proper for counteracting inflammation. In short, relief is to be sought in the antiphlogistic regimen, which consists in the employment of blood-letting, purgatives, diaphoretics, and diluents, and in abstinence from all vegetable or animal substances, which have a tendency to excite, or to augment the febrile action. It is a regimen which must be pursued, so long as inflammatory fever continues. It is only in cases in which the fever from the first assumes a typhoid character, or where the mortification takes place without the previous occurrence of fever, that any deviation from the antiphlogistic regimen can be allowed.

Dr. Thomson, from whom I have borrowed the foregoing passage, also notices the present common aversion to bleeding in compound fractures, erysipelas, carbuncle, hospital gangrene, burns, and frostbite; cases in which the patient, it is said, can seldom bear with impunity any considerable loss of blood. "In many instances of these injuries and affections (says he) blood-letting, I know, is not required; but I am doubtful, even if it were generally employed, whether it would produce all the mischiefs, which have of late years been ascribed to it. I believe it to be the most efficacious of any of the remedies that can be employed, in all cases of inflammatory fever threatening to terminate in gangrene, and that its use in such cases ought never to be omitted in the young, strong, and plethoric." (See *Lectures on Inflammation, p.* 559.) When bleeding has not been sufficiently practised, during the state of the inflammation antecedent to the mortification; when the general symptoms, which point out the existence of this state, continue violent; and, especially, when the pulse is still quick, hard, or full; it is absolutely necessary to empty the vessels a little more, even though mortification may have begun, particularly if the patient be young and plethoric. Bleeding, by diminishing the fever, and abating the general heat, is frequently the best means of all. It may then be considered better, than all antiseptics, for stopping the progress of the disorder. But this evacuation is to be employed with a great deal of circumspection; for, should it be injudiciously resorted to, from the true state of the system not being understood, the error may be followed by the most fatal consequences. It should also be well remembered, that however strongly bleeding may be indicated, the moment is not far off, when this evacuation is totally inadmissible, especially if the mortification make much progress.

In cases of acute mortification, after as much has been taken away as may be deemed safe or proper, the other parts of the antiphlogistic regimen must be continued, as long as any increased action of the heart and arteries continues. "The use of purgatives seems to be particularly required in those cases, in which the local inflammatory affection is accompanied with derangement of the digestive and biliary organs. Antimonial diaphoretics are those from which I should be inclined to expect most advantage in the commencement of the attack; but, after the inflammatory action has been subdued, opiates, either alone, or combined with antimony, or what is still better, with ipecacuanha, as in Dover's powder, are frequently of singular service, not only by diminishing pain, but also, by inducing a soft and moist state of the skin." (*Thomson, p*, 560.) A strict regimen, which may have been useful, and even necessary, during the inflammatory stage, may have a very bad effect, if continued too long, by diminishing the patient's strength, which, on the contrary, should be supported by the most nourishing food.

A vegetable diet, as Dr. Thomson observes, is to be preferred in the commencement both of acute gangrene with inflammatory fever, and of chronic gangrene with a fever from the first of a typhoid nature. Wine and animal food given too early in diseases, which have a tendency to gangrene, increase the febrile heat and frequency of the pulse, oppress the stomach, render the tongue foul, the patient restless and delirious, and his situation dangerous, if not hopeless. In the transition from gangrene to sphacelus, an abatement of the symptomatic fever usually takes place in almost all cases, which have ultimately a favourable termination. Dr. Thomson believes, that *this is the first period, at which it is safe to allow vinous liquors, or diet, chiefly animal.* (*P.* 561.)

I next come to a second very essential and important indication, to be fulfilled, as soon as the symptoms, announcing the existence of the inflammatory state, appear to abate, and the patient begins to be debilitated. This indication is *to prevent excessive weakness by the suitable employment of cordials, and, particularly, of tonics.* These same means also contribute to place the system in a proper state for freeing itself from the mortified parts, or, in other words, for detaching them. For, inflammation is the preparatory step, which nature takes to accomplish the separation of mortified parts from the living ones, and such salutary inflammation cannot take place, if the energies of life be too much depressed.

In order to fulfil the above indication, it is necessary to prescribe a nourishing diet, with a certain quantity of good wine, proportioned to the patient's strength, and the symptoms of the complaint. This diet is generally productive of more real benefit than the whole class of cordial and stimulating medicines. However, when the patient is much weakened, when the mortification of the part affected is complete, and the disorder is spreading to others, some of the following remedies may be ordered: ammonia, aromatic confection, æther, &c. In general, however, wine is best, because more agreeable than cordials; and for this purpose, one ought to prefer the most perfect wines, such as those of Spain and Madeira.

Of all the medicines, hitherto recommended for the cure of mortification, there is certainly not one, that has acquired such a character for efficacy, as the Peruvian bark. It is said, that this remedy often stops, in a very evident and expeditious manner, the course of the disorder. Being a very powerful tonic, it is thought to operate by strengthening the system, and thus maintaining in every part the necessary tone for resisting the progress of mortification. But, whatever may be its mode of acting, the advocates for this medicine contend, that it is now a well-known fact, that it ought to be employed in almost all cases of mortification, as soon as the violence of the inflammatory symptoms has been appeased.

It was Mr. Rushworth, a surgeon at Northampton, who made this discovery in the year 1715. Amyand and Douglas, two surgeons in London, soon afterward confirmed the virtue of this remedy. Mr. Shipton, another English surgeon, has also spoken, in the Philosophical Transactions, of the good effects which he has seen produced by this medicine. In the Medical Essays of Edinburgh, Drs. Monro and Paisley published several cases, illustrative of the efficacy of bark in cases of mortification. We are there informed, that when its exhibition was interrupted, the separation of the eschars was retarded, and that, on the medicine being resorted to again, such a separation went on again more quickly. Since this period, all practitioners, both in England and elsewhere, have had recourse to this remedy, which has every where obtained the highest praises. Unfortunately, these praises have induced surgeons to employ it indiscriminately, and with equal confidence, in all cases.

We cannot indeed doubt, that bark has frequently had the most salutary effect, in cases of mortification, though sometimes it may probably have had imputed to it effects, which were entirely produced by nature. The following observation, made by Dr. Thomson, is highly worthy of recollection: "In attending to the effects, supposed to result from the operations of the external and internal remedies, which are daily employed for the cure of mortification, there are two facts, well ascertained, which appear to me to be peculiarly deserving of your regard. The first of these is, that mortification often stops spontaneously, without any assistance whatever from medicine; the second, that it often begins, and continues to spread, or even after it has stopped for a while, recommences and proceeds to a fatal termination, in spite of the best directed efforts of the healing art." (See *Lectures on Inflammation,*

p. 557.) In many cases, bark is evidently hurtful, when exhibited prematurely. There are other instances, in which it is impossible to employ it in a sufficient quantity, the stomach not being able to bear it in any form. In general, it should never be administered, when the pulse is high, and other inflammatory symptoms exist; but, when the tension of the part diminishes, the pulse sinks, and symptoms of weakness commence, and particularly, when with these circumstances, we perceive a separation beginning to take place between the dead and the living part, bark hardly ever fails to support the strength of the constitution, and powerfully to accelerate the separation of the mortified parts. (*Encyclop. Method. Art. Gangrene.*)

However, as I have already remarked, it is quite wrong to prescribe bark, in every instance, as the sole remedy; for there are many cases, in which it is unnecessary; some, in which it does harm; and others, in which it is totally inefficacious. It is a medicine obviously of no service, when the mortification arises from an external cause, and is the only complaint, in a healthy, strong constitution. It is equally unnecessary, when the sphacelus is of the dry sort, and has ceased to spread, at the same time, that the living margin appears to be in a state of inflammation, without any universal debility. But it deserves particular notice, that the circumstances of each individual case are liable to such considerable variation, that though bark may be at first unnecessary, it may afterwards be indicated.

In some cases of sphacelus, bark is hurtful. The disorder is generally attended with fever, which may be of three kinds; inflammatory; typhoid, or attended with extreme debility; or one connected with a disordered state of the abdominal viscera.

In the latter case, which is far more common than is supposed, bark is manifestly pernicious. Here, the indication is to empty the stomach and bowels as quickly as possible. When this has been done, if bark should now be indicated by any of the circumstances already pointed out, it may be safely administered. But there is a great necessity for procuring evacuations as speedily as possible, before much debility has occurred.

Sometimes, mortification is accompanied with a low typhoid kind of fever, which, whether the cause, or the consequence of the local mischief, demands the exhibition of bark.

However, mortification may be attended with common inflammatory fever, and then the living margin is generally inflamed and painful. This is particularly the case, when mortification is the consequence of genuine acute inflammation, or of an external injury in a healthy subject. Here, bark must obviously be injurious. Still, it is wrong to regard this medicine as invariably hurtful, whenever sphacelus is the effect of inflammation. It has already been observed, that the inflammation frequently has less share in the origin of the disorder than some incidental cause, which oftentimes requires the exhibition of bark. Even when mortification is the pure effect of inflammation, great prostration of strength may subsequently arise, and indeed does mostly take place at a certain period of the disorder. In this circumstance, the voice of experience loudly demands the employment of bark, though its exhibition would have been at first useless or hurtful. While genuine inflammatory fever, and local inflammation, are coexistent with mortification, antiphlogistic means are undoubtedly useful; but, great caution is requisite, since, in cases of humid gangrene, as it is termed, the inflammatory state very soon changes into one, in which the great feature is prostration of strength.

When there is mere prostration of strength, without any symptom of gastric disorder, or of inflammation, or typhoid fever, bark is evidently proper, though seldom effectual alone; diaphoretic, and nervous medicines being also proper, opium, wine, camphor, ammonia, brandy, &c. The constitutional disorder may be either inflammatory, typhoid, or one connected with gastric disorder. Consequently, there are three plans of constitutional treatment, and it is easy to determine the particular cases, in which bark is unnecessary, hurtful, or inefficacious.

We meet with one species of mortification, in which the patient experiences severe pain in the part, without the smallest appearance of inflammation. Here bark is never of any use, and opium is regarded as the only medicine of much efficacy. This subject will be more fully considered presently, when Mr. Pott's remarks on a peculiar mortification of the toes and feet will be introduced.

Bark sometimes occasions purging, and then it also proves inefficacious and hurtful. This effect, however, may frequently be prevented by adding a few drops of laudanum to each dose.

Bark often disagrees with the stomach; but it less frequently does so, when given in an exceedingly fine powder, which also generally proves most inefficacious. Also the administration of bark with wine, some aromatic water, or in the form of the cold infusion, is less likely to disorder the stomach. (*Richter, Anfangsgr. der Wundarzn. Kap.* 3.)

Several years ago I published a critique on the indiscriminate employment of bark in cases of mortification, and my remarks were inserted in the article *Gangrene* in *Dr. Rees's Cyclopædia.* Many of them were introduced into the 2d edition of this Surgical Dictionary, printed in 1813. (See *Cinchona.*) Since this period, I am happy to find, that the blind enthusiasm with which bark was prescribed is beginning to subside, and that on this subject some eminent surgeons have of late publicly avowed sentiments, which entirely coincide with my former statements. "I think (says Dr. Thomson) I have frequently seen it prove hurtful, when administered in cases of mortification, by loading the stomach of the patient, creating a dislike to food, and sometimes by exciting an obstinate diarrhœa. *I believe it to be, in mortification, a medicine completely inert and inefficacious.*" (See *Lectures on Inflammation, p.* 563.) By this expression, Professor Thomson does not mean to say that bark can never be useful in cases of mortification, but only that it has no specific power in checking the disorder, as many have erroneously inculcated.

"Bark (says Professor Boyer) has been considered by several distinguished English practitioners, as a true specific against gangrene in general, and especially against that which depends upon an internal cause; but, subsequent observations to those published in England have proved, that it has no power over the immediate cause of gangrene, and that it only acts as a powerful tonic in stopping the progress of the disorder, and promoting the separation of the mortified parts." (See *Traité des Maladies Chir. T.* 1. *p.* 151, *Paris*, 1814.) Boyer also particularly objects to bark being given while inflammatory fever prevails; but, whenever he prescribes bark in cases of mortification, he seems to entertain the old prejudice of expecting benefit in proportion to the quantity which can be got into the stomach. On the contrary, Mr. Guthrie declares, that he has not found bark useful, "further than as a tonic, and given in such quantities as not to overload the stomach." (*On Gunshot Wounds, p.* 148, *Ed.* 2.) a plan which I have always recommended. For further observations on bark, the reader is referred to the article *Cinchona.*

The sulphuric acid may frequently be advantageously given at the same time with the bark, and the best method of exhibiting it is to acidulate with it every thing which the patient drinks. Other acids are also sometimes used for the same purpose.

Carbonic acid gas is another remedy of the highest efficacy in cases of chronic mortification. It has even been known to have the most beneficial effects when bark has failed in doing good. Water impregnated with this gas should be recommended, as a most beneficial kind of drink.

The *hospital gangrene* is a case for which bark has been much recommended. The best mode of treating this particular case, however, has been detailed in a separate article. (See *Hospital Gangrene.*)

A third indication, which should be observed together with the second, or which should even precede it in many instances, is *to lessen the irritability and sufferings of the patient, by the use of opium.* Attention to this desideratum frequently contributes more than any thing else to stop the progress of the disorder, and is often indispensable in order to promote the operation of other remedies. In all cases of mortification, every thing which heats, irritates, or adds to the patient's sufferings, appears, in general, to augment the disorder, and increase the rapidity of its progress. On the other hand, every thing which tends to calm, assuage, and relax, frequently retards the progress of mortification, if it produce no greater good. The pain also, which is a constant mark of too much irritation, contributes of itself to increase such irritation, and, in this double point of view, we cannot do better, in the majority of cases, than endeavour to appease it by the judicious and liberal use of opium. When the inflammatory stage evidently prevails, this medicine may be conjoined with antiphlogistic remedies, such as the nitrate of potassa, antimony, &c. In other instances, attended with debility, it may be given with bark and cordials.

Mr. Pott has described a species of mortification, for which bark is most frequently ineffectual, and opium the remedy which is to be depended upon. It is that particular kind, which, beginning at the extremity of one or more of the small toes, does, in more or less time, pass on to the foot and ankle, and sometimes to a part of the leg, and, in spite of all the aid of physic and surgery, most commonly destroys the patient.

It is very unlike the mortification from inflammation, that from external cold, from ligature, or bandage, or from any known and visible cause, and this as well in its attack as in its progress. In some few instances, it makes its appearance with little or no pain; but, in by much the majority of these cases, the patients feel great uneasiness through the whole foot and joint of the ankle, particularly in the night, even before these parts show any mark of distemper, or before there is any other, than a small discoloured spot on the end of one of the little toes.

It generally makes its first appearance on the inside, or at the extremity of one of the smaller toes, by a small black or blueish spot: from this spot the cuticle is always found to be detached, and the skin under it to be of a dark red colour.

If the patient has lately cut his nails, or corn, it is most frequently, though very unjustly, set to the account of such operation.

In some patients, it is slow and long in passing from toe to toe, and from thence to the foot and ankle; in others, its progress is rapid and horridly painful: it generally begins on the inside of each small toe, before it is visible either on its under or upper part; and when it makes its attack on the foot, the upper part of it first shows its distempered state, by tumefaction, change of colour, and sometimes by vesication; but wherever it is, one of the first marks of it is a separation or detachment of the cuticle.

Each sex is liable to it; but, (says Mr. Pott) "for one female in whom I have met with it, I think I may say, that I have seen it in at least twenty males. I think also that I have much more often found it in the rich and voluptuous, than in the labouring poor; more often in great eaters, than free drinkers. It frequently happens to persons advanced in life, but is by no means peculiar to old age. It is not, in general, preceded or accompanied by apparent distemperature either of the part, or of the habit. I do no know any particular kind of constitution which is more liable to it than another; but as far as my observation goes, I think that I have most frequently observed it to attack those who have been subject to flying uncertain pains in their feet, which they have called gouty, and but seldom in those who have been accustomed to have the gout regularly and fairly. It has, by some, been supposed to arise from an ossification of vessels: but for this opinion I never could find any foundation but mere conjecture."

In this article I have already stated the observations of Cowper, Dr. Thomson, and Mr. Hodgson upon the ossified state of the arteries in this species of mortification. The facts, recorded by the two latter writers, at least prove, that the opinion is founded, not upon mere conjecture, as Mr. Pott alleges, but upon actual observation and experience.

With respect to the insufficiency of peruvian bark, Mr. Pott observes: "I believe I may venture to say, that I have tried it as fairly, as fully, and as variously as any man has or can; I have given it in the largest quantity, at the shortest intervals, and for the longest possible space; that is, as long as the patient's life would permit: I have given it by itself in decoction, extract, and substance; I have combined all these together; I have joined it with nitre, sal. absynth. with snakeroot, with confect. cardiac. with volatile salts, and with musk, as different circumstances seemed to require, or admit; I have used it as fomentation, as poultice, as dressing; I have assisted it with every thing which has been usually thought capable of procuring or assisting digestion; still the distemper has continued its course, perhaps a little more slowly, but still it has ended in death."

Mr. Pott afterward relates the first cases in which he gave opium. His plan was generally to give one grain every three or four hours; but never less than three or four grains in the course of four and twenty hours. Mr. Pott, however, did not propose opium as an universal infallible specific; but only as a medicine which would cure many cases not to be saved by bark.

The observations of Mr. Pott on the local treatment of these cases are of great practical importance: no part of his writings has a stronger claim to attention.

"I have found (says he) more advantage from frequently soaking the foot and ankle in warm milk, than from any spirituous or aromatic fomentations whatever; that is, I have found the one more capable of alleviating the pain which such patients almost always feel, than the other; which circumstance I regard as a very material one. Pain is always an evil, but, in this particular case, I look upon it as being singularly so. Whatever heats, irritates, stimulates, or gives uneasiness, appears to me always to increase the disorder, and to add to the rapidity of its progress; and, on the contrary, I have always found, that whatever tended merely to calm, to appease, and to relax, at least retarded the mischief, if it did no more.

"The whole plan of the chirurgic treatment of this disease is founded on a general idea of warming, invigorating, stimulating, and resisting putrefaction; and the means generally made use of are very proper for such purpose: but I must own that I think the purpose, or intention, to be improper."

Mr. Pott afterward observes: "Cases exactly similar, in all circumstances, are not to be met with every day, but I am from experience convinced, that of two, as nearly similar as may be, in point of pain, if the one be treated in the usual manner, with a warm, stimulating cataplasm, and the other only with a poultice made of the fine farina seminis lini, in boiling milk or water, mixed with ung. sambuc. or fresh butter, that the pain, and the progress of the distemper, will be much greater and quicker in the former than in the latter.

"When the black or mortified spot has fairly made its appearance on one or more of the toes, it is the general practice to scarify or cut into such altered part with the point of a knife or lancet. If this incision be made merely to learn whether the part be mortified or not, it is altogether unnecessary, the detachment of the cuticle, and the colour of the skin, render that a decided point: if it be not made quite through the eschar, it can serve no purpose at all: if it be made quite through, as there is no confined fluid to give discharge to, it can only serve to convey such medicines as may be applied for the purpose of procuring digestion to parts capable of feeling their influence, and on this account they are supposed to be beneficial, and therefore right.

"When the upper part of the foot begins to part with its cuticle, and to change colour, it is a practice with many to scarify immediately; here, as in the preceding instance, if the scarifications be too superficial, they must be useless; if they be so deep as to cause a slight hemorrhage, and to reach the parts which have not yet lost their sensibility, they must do what indeed they are generally intended to do, that is, give the medicines, which shall be applied, an opportunity of acting on such parts.

"The medicines most frequently made use of for this purpose are, like the theriaca, chosen for this supposed activity; and consist of the warm, pungent oils and balsams, whose action must necessarily be to stimulate and irritate: from these qualities they most frequently excite pain, which, according to my idea of the disease, is diametrically opposite to the proper curative intention; and this I am convinced of from repeated experience.

"The dressings cannot consist of materials which are too soft and lenient; nor are any scarifications necessary for their application. But I would go farther and say, that scarifications are not only useless, but, in my opinion, prejudicial, by exciting pain, the great and chiefly to be dreaded evil in this complaint. The poultice should be also soft, smooth, and unirritating; its intention should be merely to soften and relax;

it should comprehend the whole foot, ankle, and part of the leg; and should always be so moist or greasy as not to be likely to become at all dry or hard, between one dressing and another."

When the toes are, to all appearance, perfectly mortified, and seem so loose as to be capable of being easily taken away, it is, in general, thought right to remove them. But, however loose they may seem, if they be violently twisted off, or the parts, by which they hang, be divided, a very considerable degree of pain will most commonly attend such operation, which therefore had much better be avoided; for Mr. Pott has seen this very pain, thus produced, bring on fresh mischief, and that of the gangrenous kind.

If the patient does well, these parts will certainly drop off; if he does not, no good can arise from removing them. (*Pott's Works.*)

In cases, in which the disorder is attended with a great deal of irritation, many subsequent practitioners have attested the efficacy of opium; though it has not always had the same success in their hands, when the mortification depended chiefly on constitutional debility. Dr. Kirkland observes, that we must be careful not to force the doses, especially at first; and that the medicine does more harm than good, when its soporific effects go so far as to occasion delirium, take away the appetite, or cause affections of the heart.

Some authors have also recommended the use of camphor, which, by reason of its narcotic virtue, has sometimes produced good effects. Pouteau attributes considerable efficacy to it, especially in the erysipelatous gangrene arising from wounds. In such cases, he recommends it to be given in the dose of five grains, with a double quantity of nitre, every four hours.

Few surgeons of the present day believe, that opium possesses as much power in the preceding cases, as Mr. Pott represented. While Dr. Thomson allows, that opium is much more entitled to the attention of practitioners than bark, as an useful medicine in the treatment of mortification, yet, "in saying so much in favour of opium, (he observes,) I would not by any means have you to place the same reliance on its powers for stopping, even the mortification of the toes and feet in old people, which appears to have been done by Mr. Pott. From the trials which I have made, and which I have seen made by others, I cannot allow myself to believe, that its powers in stopping this particular sort of mortification are greater, than in stopping any other form, or variety of the disease. It is obvious, however, from Mr. Pott's account, that his mind was strongly impressed with a very different opinion. His opinion seems to me to have been formed from the results of a very small number of cases, and in complete forgetfulness of the invaluable observations of his preceptor Mr. Sharp, with regard to the frequent spontaneous stoppage of mortification in cases in which no medicines whatever are used." (See *Thomson's Lectures on Inflammation, p.* 568.)

2. With respect to the external, or local treatment of mortification, the first indication consists in removing, if possible, such external causes, as may have occasioned, or kept up the disorder; as the compression of bandages, ligatures, tumours; all irritating substances, &c.

When mortification arises from inflammation, which still prevails in a considerable degree, it is evident, that the dead part itself only claims secondary consideration, and that the principal desideratum is to prevent the mortification from spreading to the living circumference, by lessening the inflammation present. Hence, under such circumstances, the application of linen, wet with the saturnine lotion, and the maintenance of a continued evaporation, from the inflamed parts surrounding the mortified flesh, must be just as proper as if the mortification itself did not exist, and were quite out of all consideration.

It has been justly remarked by an eminent man, (*Hunter*) that the local treatment of mortification, (meaning that in consequence of inflammation) has been as absurd as the constitutional; scarifications have been made down to the living parts, in order that stimulating and antiseptic medicines might be applied to them; such as turpentines, the warmer balsams, and sometimes the essential oils. Warm fomentations have been also applied, as being congenial to life; but, warmth always increases action, and should, therefore, be well adjusted to the case; for, on the other hand, cold debilitates or lessens powers, when carried too far, though it first lessens action. Stimulants are likewise improper, as the actions are already too violent. It is proper to keep the parts cool, and all the applications should be cold. In cases of mortification from inflammation, good effects have also been seen to arise from the topical, as well as internal employment of opium.

But it must be acknowledged, that however proper the employment of cold applications may be in principle, in cases of mortification, attended with inflammation, fomentations and emollient poultices are most commonly preferred in practice.

Besides common poultices, there are several others, which have acquired great celebrity, as topical applications in cases of mortification. Of this kind are the cataplasma carbonis,* cataplasma cerevisiæ,† and the cataplasma effervescens.‡

These local remedies are, perhaps, in nine cases out of ten, superior to all others.

With respect to stimulating and spirituous applications, such as brandy, spirit of wine, balsams, resins, and aromatic substances, which have been recommended by a vast number of authors, they are almost entirely laid aside by modern practitioners. Though such things are indeed really very useful in preserving dead animal substances from becoming putrid, a very little knowledge of the animal economy is requisite to make us understand, that they cannot act in this manner on parts still endued with vitality; but, on the contrary, that they must have highly prejudicial effects, in the cases under consideration, by reason of the violent irritation which they always excite, when applied to the living fibres. It may now and then, however, be justifiable to apply spirituous applications to the dead parts themselves with a view of diminishing the fetid effluvia, which, by contaminating the air, have some share in injuring the patient's health; but the greatest care is requisite to keep these stimulants from coming into contact with the living surfaces around and beneath the sloughs.

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* Prepared by mixing about oz. ij. of finely powdered wood-charcoal with half a pound of the common linseed poultice.

† Prepared by stirring into the grounds of strong beer as much oatmeal, as will make the mass of a suitable consistence.

‡ Prepared by stirring into an infusion of malt as much oatmeal, as will render the substance of a proper thickness, and then adding about a spoonful of yest.

There are a few surgeons, however, who still place confidence in certain stimulating applications. "In the less acute and more chronic cases of gangrenous inflammation, as in malignant erysipelas and carbuncle, in the gangrene of the toes and feet of old people, in the sphacelating state of hospital gangrene, and in severely contused wounds, in which gangrene and sphacelus have supervened, the emollient poultice, which is applied to promote the separation of the dead parts, may have an addition made to it of a greater or less quantity of the unguentum resinosum, or even of oil of turpentine itself. In the more severe of these cases, where we have reason to dread the extension of the sphacelus, warm dressings, as they have been termed, which are formed by dipping pledgets of charpie in a mixture of equal parts of the unguentum resinosum and oil of turpentine, may be applied, of a temperature as hot as the patient can bear without pain; and over these we may lay an emollient poultice, of a large size and soft consistence.

"After the sphacelus stops, and the process of ulceration begins in the inflamed line of contact, between the dead and living parts, it will often be found, that the turpentine dressings are too stimulating, and occasion a considerable degree of pain. When this happens, we must either diminish the quantity of the turpentine in the dressings, or remove it altogether, according to circumstances. Besides the pain, a considerable extension of the ulceration would be, in general, the effect of continuing these applications after they begin to produce uneasiness. The ulcerating surface is, in the progress of separation, liable to pass under every mode of treatment, into the state of a painful and irritable ulcer; and in this state, it may require to be treated with decoctions of poppy-heads, or with the application of the turnip, carrot, fresh hemlock leaf, stale beer, fermenting poultices, &c." (See *Thomson's Lectures, p.* 577, 578.)

The hospital gangrene is undoubtedly a case, which requires powerful applications, like Fowler's solution of arsenic, or the undiluted mineral acids; and, in Guy's Hospital, phagedenic sloughing ulcers are usually treated by Sir A. Cooper with the nitric acid lotion, 50 drops to a quart of water, and the internal exhibition of the subcarbonate of ammonia. The cases also termed sloughing phagedœna by Mr. Welbank, and considered by him as analogous to hospital gangrene, may be cured by dressing them with the undiluted nitric acid. (See *Med. Chir. Trans. Vol.* 11.) I conceive, that it has only been in hospital gangrene, and other cases of sloughing phagedenic ulcers, that various acids, diluted, or undiluted, other caustic substances, and the actual cautery, have sometimes proved really serviceable. The muriatic acid, diluted with six times its quantity of water, was particularly recommended by Van Swieten, who applied it after making scarifications. In this manner, he stopped a sloughing disease extending all over the scrotum and penis. This author strongly recommends the same topical application to the sloughy state of the gums in cases of scurvy. In this kind of case, he mixed the muriatic acid with honey, in various proportions; sometimes, he even employed the pure acid itself for touching the parts, which were likely to slough. It is also by supposing, that the diseases referred to, were of a phagedenic character, that I account for the good effects, imputed by Dr. Kirkland and others, in cases of mortification, to another still more active caustic, namely, a solution of mercury in nitrous acid, with which the edges of the living flesh were touched. At all events, if the diseases were common cases of sloughing, I infer, that such remedies were not really necessary, and that nature triumphed both over the disease and the supposed remedy. The following is a case related by Dr. Kirkland:

A man met with a fracture of the forearm, and the ends of the bones projected through the integuments. The fracture was very expeditiously reduced; but, at the end of five or six days, the whole arm seemed to be completely mortified up to the shoulder. Amputation was performed as near the joint as possible, and the stump, which had mortified as far as the acromion, was cauterized. The following day the mortification had reached the inferior extremity of the scapula. A little of the solution of mercury in nitrous acid was now applied, by means of a probe, along the edges of the parts affected, and from this moment the disorder made no further progress. This cauterizing was repeated every day, for seventeen or eighteen days. The sloughs, and even the scapula itself, were detached, and the patient got well.

On the continent, liquid caustics are sometimes used as topical applications to gangrenous diseases, more especially, however, in cases of hospital gangrene, and malignant carbuncle. Of this last disorder, Larrey has recorded a very dangerous example, in which he effected a cure by first cutting away as much of the sloughs as possible, and then applying to the disorganized surface underneath liquid caustics. Under the use of emollients, two persons had already fallen victims to the disease in the same family. (See *Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 53.)

With respect to the actual cautery, Celsus recommended it to be applied to the line, which separates the dead parts from those which are still living, whenever medicines, and, particularly, topical emollient applications, failed in stopping the progress of the disorder. Pouteau ventured to revive this practice, which had been entirely exploded from modern surgery, and he was of opinion, that the method would have the most beneficial effects, in cases of erysipelatous gangrene, which is so often seen in hospitals, in consequence of wounds. For this purpose, he recommends cauterizing chiefly the edges of such parts, as are of a dark red colour, and are on the point of perishing; and he advises this to be done with a heated iron, or boiling oil, and to repeat the cauterizing of the dead parts, at every time of dressing them, until the sensation of heat is even felt with a certain degree of force in the sound parts. The whole of the affected part is afterward to be covered with a large emollient poultice.

Pouteau relates a case of anthrax, which took place on a woman's cheek, and which he cured in the above manner. The tumour, which, on the third day, was quite black, and as large as a walnut, was accompanied by an erysipelatous œdema, which extended over the whole cheek, eyelids, and front of the neck. Pouteau, after having opened the tumour in different directions with a lancet, introduced the red hot cautery, and repeated the application several times, until the heat was felt by the sound flesh. The patient felt herself very much relieved immediately after this had been done; an oppressive headach, and a very afflicting sense of strangulation, which she had before experienced, were got rid of, and, in ten days more, the slough was detached on the occurrence of suppuration. (*Encyclopédie Méthodique, Partie Chirurgicale, Art. Gangrene.*)

But perhaps, of all the species of mortification, the hospital gangrene is that, for which the use of caustics and the actual cautery itself, has had the most numerous and respectable advocates. The heated iron is even now employed by the first surgeons of Paris for this particular case. (See *Sketches of the Medical Schools of Paris, by J. Cross, p.* 84, *and Hospital Gangrene.*)

The foregoing observations are introduced into this work, that the reader may not be left entirely ignorant of what violent measures have been adopted in cases of mortification, and the account is not given, in order that such practice may be again imitated, with the exception perhaps of certain cases of phagedœna and hospital gangrene, cases, in which the most powerful local applications seem indispensable. See *Hospital Gangrene*, and *Nitric Acid*.) The common employment of these terrible applications, viz. the actual cautery, the undiluted mineral acids, and boiling oils, is as unscientific, and unnecessarily painful, as it is unproductive of any essential good. The grand object in almost every case of mortification, is to diminish the irritation of the parts in immediate contact with those already dead. This is indicated, lest the parts still alive, and so situated, should experience the same fate as the contiguous ones. In most of the other cases specified by Dr. Thomson, my experience leads me to prefer emollient soothing applications, none of which are stronger than the cataplasma carbonis, or the stale beer, fermenting, hemlock, or carrot poultices. When the process, by which a slough is detached, is somewhat advanced, I have seen a weak solution of the extract of opium in water put under the emollient poultice, along the line of separation, give considerable ease, at the same time that it seemed to promote the changes, by which the dead parts were loosened.

In the gangrene produced by pressure and weakness in persons, who are compelled by diseases and injuries to lie for weeks and months in one posture, the mode of treatment is a matter of extreme importance, and frequently makes the difference of life or death to the poor sufferer. This affection usually has its seat in parts which are but thinly covered with muscular flesh. It occurs towards the latter stages of long-continued febrile diseases, as after typhus, or hectic fever, attended with tedious suppurations; or even without these fevers, as in paralysis, and in very bad compound fractures. However, as Dr. Thomson observes, there are two forms of disease, arising from pressure, which have not always been accurately discriminated. One of these is the preceding sort of sloughing; the other is a chafed, excoriated, and ulcerated state of the parts.

Sometimes uncleanliness tends to cause this sort of mortification, that is, when the urine wets the patient's clothes. When this is the case, such irritation must be prevented by every possible means. If the skin be excoriated and broken, the powder of tutty, or lapis calaminaris, should be sprinkled over the part; or if an ointment be required, says Dr. Thomson, those which contain zinc or lead are the best. But, when the ulceration threatens to extend, these remedies are to be laid aside, and an emollient, hemlock, carrot, or fermenting poultice used. (*P.* 580.) I have seen in the irritable state of such ulceration, the solution of opium under a common linseed poultice do more good than any other application.

But no topical remedies will in any of these cases avail, unless the chief cause of the disorder be removed. This is to be effected by change of position, and laying pillows and cushions of the softest materials in convenient places under the patient; not directly under the disease itself, but in situations where they will tend to raise the parts affected from the contact of the bedding. A circular hollow pillow will often accomplish this important object; but, when possible, an entire change of posture is to be preferred.

When sphacelus succeeds to gangrene from pressure, I have often seen camphorated spirit applied; but never with decided advantage. A common emollient poultice, and in very bad cases, the topical use of the solution of opium along the living margin, are the means upon which I place most reliance, care being taken to improve the general health, without which grand indication, neither the removal of the pressure, nor the virtues of any dressings, will answer. Dr. Thomson speaks most highly of the fermenting poultice, which I believe to be in these cases an excellent application. He confesses, however, that he has sometimes found it too stimulating, and been obliged to substitute the simple emollient, carrot, or turnip poultice. (*P.* 580.)

When mortification arises from cold, every sort of warm emollient application must be avoided, and cold water, or even snow, or ice, employed. See *Chilblains.*

The local treatment of the mortification of the toes and feet, as described by Mr. Pott, has been already considered, and is that to which my observations incline me to give the preference.

The gangrenous affection of the pudenda, to which female children are liable, was successfully treated by Mr. K. Wood by applying the liquor plumbi acet. dilutus in a tepid state, and bread poultices made with the same lotion. As soon as the ulcers became clean, they were dressed with the unguentum zinci. (See *Med. Chir. Trans. Vol.* 7.) Other cases, which also ended well, have been dressed with lint, dipped in camphorated spirit, and covered with a poultice; or, at first, poultices made with the opium lotion, and after the separation of the sloughs, the ulcer was dressed with port wine and decoction of bark in equal proportions. In some cases, however, mild stimuli proved injurious. (*James on Inflammation, p.* 289.)

The old practitioners used to give vent to putrid matter, by making deep scarifications in the integuments. The majority of authors who have treated of mortification have very much insisted upon this plan, which they recommend in all cases. They even advise the incisions to be made down to the sound parts, in order to facilitate the application of topical stimulants, and to favour the operation of the supposed antiseptic qualities of these dressings. But, with the exception of cases, in which the gangrenous parts lie under an aponeurosis, or others in which the integuments, which have escaped destruction, cover a mixture of matter and sloughy cellular substance, either in consequence of foregoing inflammation, or any other cause, such as the extravasation of urine in the scrotum, all scarifications which penetrate as far as the living parts, are often productive of the most serious mischief, instead of advantage. Such incisions cannot be practised, without occasioning a great deal of pain, and producing inflammation, which often makes the mortification spread still further. But, as parts, which are in a complete state of sphacelus, are absolutely extraneous substances, in regard to those which still retain their vitality, all such portion of them as is already loose should be removed. By lessening the size of the putrid mass, the fetor is diminished, an outlet may sometimes be made for the escape of a great deal of putrid discharge, which, being confined, might have a bad effect on the neighbouring living parts; and the latter are enabled to free themselves more easily from the rest of the sloughs.

The too common practice of accelerating, with a cutting instrument, the separation of the mortified parts, previously to the completion of the process, by which nature breaks the connexion between them and the living flesh, in general ought to be strongly reprobated, as causing unnecessary pain, and irritation, and creating the risk of a renewal of the sloughing. As far as my experience goes, gangrenous phagedœna is the only instance, in which it seems useful to remove the sloughs, before they are loose, so as to let the topical applications extend their action without delay to the subjacent living surface. (See *Hospital Gangrene.*) Pott's sentiments, with respect to the danger and inutility of cutting the tendons and ligaments, in the mortification of the toes and feet, have been already stated.

If the surgeon prudently await the event of things, the separation of the mortified from the living parts will soon follow the establishment of inflammation and suppuration at the edges of the slough.

But when the whole thickness of a limb is affected with mortification, ought the surgeon to leave things to nature? or ought he to have recourse to amputation.

In general, the performance of amputation is indispensable; not that nature would not in many instances detach the sphacelated part; but, because a great length of time would be required for the completion of the process, and a serviceable stump would rarely be left.

Another important question then arises, Should the surgeon amputate, while the mortification is in a spreading state? Or ought he to defer the operation, until a line of separation begins to form between the dead and living parts?

"Amputation (says a distinguished professor) was long regarded as one of the most effectual means which could be employed to prevent the extension of gangrene. This practice, however, has not received the sanction of experience; on the contrary, it has been generally found, wherever it has been practised, in either acute or chronic gangrene, to accelerate much the progress of the disease; and, in this way, to hasten the death of the patient. The parts, which were divided in amputation, though at a distance from a spreading gangrene and from sphacelus, were found speedily to assume the appearance of the affection, for which the operation had been performed. *Till, therefore, the adhesive inflammation comes on, and a distinctly marked separation of the dead from the sound parts takes place, amputation is, in few, if any cases of mortification, admissible.* We never know, previously to this, where a gangrene, or sphacelus, is to stop, nor whether the powers of the constitution be sufficient to sustain the injury that the mortification has inflicted. Even when the adhesive inflammation comes on, it is in most cases best to allow some time to elapse before we operate, partly with a view to give time for the constitutional symptoms to abate, in other instances, to allow the patient's strength to be recruited by nourishment and cordials; and partly also with a view to learn whether the constitution of the patient be indeed capable of so great a fresh shock, as that which amputation must necessarily occasion." (See *Thomson's Lectures, p.* 582.)

According to Richter, there is never any certainty, that we are amputating in living parts. Mortification rapidly ascends along the cellular substance, surrounding the large blood-vessels, and is frequently much more extensive internally, than external appearances would lead one to suppose. The adjacent surface, still apparently alive, is often so affected, that it must inevitably slough, though, at present, it may not actually have sphacelated. The surgeon imagines, that amputation is performed on living parts; but, soon afterward discovers, that he has been dividing those which are dead. The operation, he observes, can do no good, while the mortification is in a spreading state, and it may do considerable mischief. The disorder enlarges its limits, because its cause still operates, and this is not removable by amputation. If the operation be now injudiciously undertaken, the sphacelus invades the wound, and is the more certainly mortal, as the patient has been further weakened by amputation, and its consequences.

Many mortifications, especially those which arise from external causes, very often spontaneously stop and separate. But the place where this will happen, can never be foreseen. By amputating in this circumstance, we run a risk of disturbing nature in her salutary work, and rendering the disorder fatal.

The following are the only cases, in which Richter allows that the use of the knife is justifiable and proper. There exists a species of sphacelus, which rapidly occasions death, before it is yet of great extent. Here indeed, amputation might be really advisable; but, the nature of the case is unfortunately never disclosed, before the fatal catastrophe. Some external injuries would be, without the operation, inevitably followed by mortification. In such cases, early amputation is evidently proper; for, the simple incision is attended with less danger than sphacelus. Sometimes, says Richter, a sphacelus spontaneously ceases to spread. This happens most frequently in cases which originate from an external cause, such as a violent contusion, burn, &c. But, the occurrence is not restricted to this kind of case, nor is it invariably attendant on it. When there are no other occasional causes present, the mortification does not readily go beyond the limits of the contusion, or violent burn; but the interference of surgery can hardly ever put a stop to its progress, before it has spread as far as the extent of the local injury. (*Anfangsgrunde der Wundarzneykunst, Band.* 1, *Kap.* 3.)

How different are the doctrines of Baron Larrey upon this subject from those entertained by Richter, and, indeed, the generality of eminent modern surgeons. "Writers on gangrene, or sphacelus of the extremities, (says Larrey) indiscriminately recommend the amputation of a sphacelated limb never to be undertaken before the mortification is bounded or limited by a reddish circle, forming a true line of separation between the dead and living parts. This circumstance can only occur in a case of spontaneous gangrene from an internal cause; or if it happens, as is very unusual, in a case arising from a wound, its progress is different, and it would be exceedingly imprudent to wait for it. *The gangrene from external injuries almost always continues to spread; the infection becomes general; and the patient dies.*" (*Mém de Chirurgie Militaire, T.* 3, *p.* 142.) Respecting the want of foundation for this hypothesis of infection, I need here offer no remarks, having already expressed my opinion upon it in a foregoing page. On the other hand, Larrey asserts, that, in the dry, or spontaneous gangrene, absorption takes place with more difficulty, and it is not uncommon to see the sphacelated parts separate from the living ones by the powers of nature alone, without the general functions being impaired. He argues that there is a manifest difference between what he terms the *traumatic* and the *spontaneous* gangrene, or, in other words, between the *humid* gangrene from an external cause, and the *dry* gangrene, which ordinarily proceeds from an internal cause. (*P.* 148.)

In cases of mortification, arising from external injuries, Larrey maintains, that, "notwithstanding any thing that writers and practitioners may allege to the contrary, we should not hesitate about promptly performing amputation, as soon as the necessity for the operation is decidedly established. There is no reason to apprehend, that the stump will be seized with gangrene, as in the spontaneous mortification, which has not ceased to spread, *because the traumatic gangrene, after having arisen from a local cause, is only propagated by absorption,* and a successive affection of the texture of parts by continuity of the vessels. Amputation, performed in a proper situation, stops the progress and fatal consequences of the disorder.

"Supposing then the lower half of the leg should be affected with sphacelus, in consequence of a gunshot injury, attended with a violent contusion of the part, and a forcible concussion of the vessels, nerves, and ligaments, if the skin is elsewhere uninjured, the operation may be done in the place of election, without any fear of the stump becoming gangrenous, notwithstanding the cellular membrane of the upper part of the member may be already affected. But, when the skin of the whole leg is struck with mortification, the operation must be done on the thigh, and no time should be lost. The same practice is applicable to the upper extremities. We must be careful not to mistake a limb affected with stupor for one that is actually sphacelated. In the first case, warmth, motion, and sensibility are still retained, although the skin may be blackish and the parts may be swollen. Besides, if there were any doubt, it would be proper to try at first tonic repellent applications, and cordial medicines, &c." (See *Mém de Chirurgie Militaire, T.* 3, *p.* 152, 153.)

When amputation has been practised, this author recommends the exhibition of bark, good wine, tonics, &c. in order to promote the good effects of the operation. (*P.* 154.)

"The facts (says Larrey) which I shall relate in the course of this dissertation, will prove, I think, in an incontestable manner, the truth of the principle which I lay down, that *when gangrene is the result of a mechanical cause, and puts the patient's life in danger, amputation ought to be performed, without waiting until the disorder has ceased to spread.*

"I have been a witness of the death of several individuals, from too rigorous an adherence to the contrary precept; and, at length, grievously impressed with this loss, I had long ago determined to depart from an axiom, which was always considered by me as false. Besides, following the maxim of Celsus, I preferred employing an uncertain remedy, rather than abandon the patient to an inevitable death. *Satius est enim anceps auxilium experiri quàm nullum.*

"I made the first attempt at Toulon, in the year 1796, upon a soldier, who, in consequence of a violent contusion of the foot, was afflicted with a gangrenous ulcer, which soon threw the whole part into a sphacelated state. While the mortification was yet spreading, I resolved to amputate the leg. The success of the operation surpassed my expectations; the stump healed; and, in less than forty-five days, the patient got quite well. This case served to encourage me.

"During the siege of Alexandria, in Egypt, in 1801, a second case, very analogous to the preceding, occurred in my practice; it happened in a dragoon of the 18th regiment, whose fore-arm and afterward arm sphacelated, in consequence of a gunshot wound in the articulation of the left arm. The mortification had extended nearly as high as the shoulder, and the patient's life was in great danger, when I determined to amputate the limb at the shoulder-joint. The disorder was manifestly spreading, and the patient's brain already affected, for he had symptoms of ataxia; the operation, however, arrested the progress of the sloughing, and saved the patient's life, who, at the conclusion of the siege of Alexandria, was quite cured.

"After the taking of Ulm, M. Ivan, surgeon to his majesty the Emperor, performed in my presence, and at my ambulance established at Elchingen, the amputation of the thigh of a soldier belonging to the 76th regiment of the line, the leg having sphacelated in consequence of a gunshot injury. The gangrene was not limited, and evidently extending itself; yet, the effects of the disorder were destroyed, and the patient was quite cured on our return to Austerlitz.

"A fourth patient, an officer in the same regiment, shot in the ankle, at the capture of the same town, was conveyed to my ambulance, in order to be dressed: it was the third day after the accident; the foot was gangrenous, and the leg was swelled, and threatened likewise with mortification. Febrile symptoms had also come on. I hastened to amputate the leg a little above the place of election. The cellular membrane of the stump, of a yellow blackish colour, was already infected with the gangrenous principle (as Larrey terms it.) The operation, however, stopped the progress of the mischief; suppuration took place in the stump; some sloughs were detached; the wound assumed a cleaner appearance; and cicatrization was completed on the fifty-second day. The patient could already walk with a wooden leg, when he caught the hospital fever, which was epidemic at Ulm, where he awaited his regiment, and, to my great regret, he was carried off by this disease, after having escaped the former danger.

"After the battles of Austerlitz and Jena, (continues Larrey,) several of my colleagues, surgeons of the first class, undertook, in consequence of my advice, and the examples of success which I had recited to them, the amputation of limbs equally sphacelated, although the mortification was not limited, rather than abandon the patient to a death, which appeared inevitable. In general, these practitioners experienced the same success as I did myself." (*Larrey, in Mém. de Chirurgie Militaire, T.* 3. *p.* 154—157.)

In Larrey's memoir upon this subject, there are some additional facts and arguments in favour of what he endeavours to prove, viz. that, in cases of mortification from external injuries, if the patient's life is in danger, amputation ought to be performed, although the sloughing may yet be in a spreading state. I must be content, however, with having stated the particulars already explained; and the reader, desirous of more, must refer to Larrey's own publication. Certainly, the facts, which this gentleman has adduced, are highly important: they tend to subvert a doctrine, and to prove the error of a practice, which have been urged in most forcible terms by most of the distinguished surgeons of modern times. The sentiments of Mr. Sharp are rendered questionable; and the truth of the positive assertion of Mr. Pott is yet a matter to be examined. The latter, it is well known, tells us, that he has often seen the experiment made of amputating, while a mortification was spreading, but never knew it answer. Are we to conclude, that all these cases, which Pott alludes to, were mortifications from an internal cause? Or, are we to suppose that the operation failed from having been delayed too long? Or, must we imagine, that the nature of the human constitution has been changed between the era of Pott, and that of Larrey?

It should be remarked, that the practice of amputation, in cases of spreading mortification, has generally had some partisans for many years past; but the weight of authorties has unquestionably been against it, and few surgeons in this country have ventured to deviate from the advice of Sharp and Pott. It is curious, however, that Mehee, a writer who wrote for the express purpose of declaring his disapprobation of the early performance of amputation in gunshot wounds, should have admitted of only one case, in which the operation is proper, namely, *gangrene succeeding the wound made by a cannonshot.* Here he thinks, that amputation ought to be performed on the first appearance of the gangrene, in order to prevent it from spreading up the limb. (See *Traité des Plaies d'Armes à feu, Paris,* 1799.) It appears, that about the year 1809, Mr. A. C. Hutchison performed with success two amputations in cases of spreading gangrene from gunshot wounds. (See *Practical Observations on Surgery, p.* 72.)

My friend Mr. Lawrence has also successfully amputated at the shoulder joint in a spreading mortification of the arm, the consequence of external violence. "The skin of the amputated limb was greenish and livid; but the cuticle not yet detached. The cellular substance distended with air, and with a discoloured offensive sanies; its appearance was not quite natural, where the incision took place; it was yellowish and anasarcous. Small effusions of blood were observed here and there in the course of the nerves; even as high as the amputated part. No coagulation of blood in any of the arteties, even down to the ulnar and digital branches. All the soft parts were discoloured, dark red, and livid, and a frothy reddish fluid issued on incision." This case had the most favourable termination, and it clearly proves, that the *humid* kind of gangrene, which occurs in a healthy subject from severe local injury, which so rapidly affects a whole limb, and reaches the trunk in a few hours, must constitute an exception to the general maxim, that amputation should never be done, before a line of separation is established between the dead and living parts. Mr. Lawrence, however, would not be understood as meaning to recommend the practice in all instances of mortification from local injury. He conceives, that a gangrene may arise, in an unsound constitution, from a comparatively slight accident; so that it may be regarded as the result of constitutional disposition, rather than of the local cause. Amputation would be hopeless under such circumstances. It is particularly in mortification, following very severe injury, in a subject otherwise healthy, that Mr. Lawrence believes the operation to be proper. (See *Medico-Chir. Trans. Vol.* 6, *p.* 184.)

Mr. Lawrence also reports another instance, in which he saw the operation succeed, though the mortification was in a spreading state. About three years ago, I was asked my opinion about the propriety of amputating at the shoulder in a spreading mortification of the arm from external violence. The operation was done, and the patient lived a fortnight afterward, which is favourable to the practice, inasmuch as he would certainly have perished in a few hours, if the operation had not been done.

Among the experienced approvers of Larrey's advice, I must not omit to mention Dr. Hennen, who has repeatedly amputated, under the circumstances above pointed out, without waiting for the line of separation; "and (says he) although I certainly was not uniformly successful, I have no reason to imagine, that death was occasioned by a departure from the rule so generally laid down by authors." (*On Military Surgery, p.* 243, *Ed.* 2.)

With regard to the early performance of amputation, where the substance of a limb perishes after exposure to cold, I find some difference of sentiment between two very high authorities. Thus Schmucker observes: "The mortification, which comes on after a part has been frozen, increases so rapidly, if the limb be exposed to warmth, that, in the space of twenty-four hours, its vitality and organization are quite destroyed, and nothing will now avail in restoring its sensibility. Here the speedy performance of amputation is the only means of preservation to be depended upon. In mortification from an internal cause, the case is different." (See *Vermischte Chirurgische Schriften, B.* 1, *p.* 15, 8*vo. Berlin,* 1785.) According to Larrey, however, this species of gangrene at length stops, and a line of separation forms between the dead and healthy parts. If the disorder be superficial, the sloughs are usually thrown off between the ninth and thirteenth days, leaving an ulcer of proportionate extent, that soon heals up. If the whole of the limb be sphacelated, nature cannot of herself effect a cure, or but very rarely, the patient mostly falling a victim to the effects of absorption, when the sloughs are detached, and the mouths of the lymphatics are opened on the occurrence of suppuration. Larrey assures us that he has seen numerous patients carried off by this cause, while the examples of a spontaneous cure were exceedingly few, and, in these, the stump was left irregular, and unfit for bearing the pressure of a wooden leg. He agrees, therefore, with the generality of surgeons, that it is in these instances advantageous to amputate the mortified portion of the limb, *but not before the extension of the gangrene has ceased, and the mischief is* *bounded by an inflammatory line.* (See *Mem. de Chir. Mil. T.* 3, *p.* 65—72.)

In the article *amputation*, notice has been taken of a sloughing, which commences in the foot, and extends up the leg, and sometimes follows gunshot injuries of the thigh, which involve the femoral artery: this is a case particularly instanced by Mr. Guthrie, as requiring the very early performance of amputation. Sir Astley Cooper also refers to cases, in which the rule was successfully deviated from, of not amputating, before limits are set to the spreading of mortification; the instances in question arose from injury of blood-vessels, and other local violence, in patients of a healthy constitution. In such cases, it is admitted by this very experienced surgeon, that the practice should be different from what is usually pursued in mortification from constitutional causes. (*Surgical Essays, Part* 2, *p.* 186.)

Fabricii Hildani Tract. Methodicus de Gangræna et Sphacelo. Quesnai, Traité de la Gangrène, 12*mo. Paris,* 1749. *Encyclopédie Méthodique, Partie Chirurgicale, Art. Gangrene. Kirkland on Gangrene, and on the Present State of Medical Surgery. Richter, Anfangsgr. der Wundarzn. B.* 1, *Kap.* 3. *Various parts of Hunter on Inflammation, &c. Sharp's Critical Inquiry into the present State of Surgery, Chap.* 8. *Richerand, Nosographie Chir. T.* 1, *p.* 215, *&c. Edit.* 4. *Lassus, Pathologie Chir. T.* 1, *p.* 30, *&c. Edit.* 1809. *Levéillé, Nouvelle Doctrine Chir. T.* 4, *p.* 321, *&c. Paris,* 1812. *Larrey, Mémoires de Chirurgie Militaire, T.* 3, *particularly the Mém. sur la Gangrène de Congélation, p.* 60, *and that sur la Gangrène Traumatique, p.* 141. *Callisen, Systema Chirurgiæ Hodiernæ, Vol.* 2, *p.* 374, *Edit.* 1800. *Dr. J. Thomson's Lectures on Inflammation, p.* 501, *Edinb.* 1813. *O'Halloran on Gangrene and Sphacelus,* 8*vo. Dublin,* 1765. *Pott's Obs. on the Mortification of the Toes and Feet in his Chirurg. Works, Vol.* 3. *J. Kirkland, Thoughts on Amputation, &c. with a short Essay on the Use of Opium in Mortification,* 8*vo. London,* 1780. *J. Harrison, The remarkable Effects of fixed Air in Mortifications of the Extremities,* 8*vo. Lond.* 1785. *J. A. Murray, In Gangrænam Scroti Obs. (Frank. Del. Op.* 10.) *C. White, Observations on Gangrenes and Mortifications, accompanied, &c. with convulsive spasms,* 8*vo.* 1790. *Pearson's Principles of Surgery, p.* 114, *Edit.* 2. *Lawrence in Medico-Chir. Trans. Vol.* 6, *p.* 184, *&c. Delpech, Mémoire sur la Complication des Plaies et des Ulcères, connue sur le Nom de Pourriture d'Hôpital; also, Précis Elémentairé des Maladies Réputées Chirurgicales, T.* 1, *p.* 73, *&c. Paris,* 1816. *Boyer, Traités des Maladies Chir. T.* 1, *p.* 105, *&c. Paris,* 1814. *John Bell's Principles of Surgery. Professor Himly's Abhandlung über der Brand der Weichen und harten Theile, Get.* 1800. *For an Account of the dry gangrene, see particularly the Writings of Hildanus, Tulpius, Quesnai Mémoires de la Societé Royale de Médecine, Tom.* 1. *Opere di Bertrandi; Medical Museum, &c. For a description of the mortification caused by eating cockspur rye, see Dodard's letter in Journal des Savans,* 1676. *Noel, in Mém. de l'Acad. des Sciences,* 1710. *Langius, "Descriptio Morborum ex esu Clavorum Secalinorum." Duhamel, in Mém. de l'Acad. des Sciences,* 1748. *Dr. C. Woolaston, in Philosophical Trans.* 1762. *Tessier, in Mém. de la Societé Royale de Médecine, T.* 1, *and* 2, *&c. O. Presscott, A Dissertation on the Natural History and Medicinal Effects of the Secale cornutum, or Ergot.* 8*vo. Lond.* 1813. *D. F. Heffter, Doctrinæ de Gangræna brevis Expositio,* 4*to. Lips.* 1807. *C. L. G. Liesching, De Gangræna,* 4*to. Gott.* 1811. *Hennen's Principles of Military Surgery, p.* 241, *&c. Ed.* 2, 8*vo. Lond.* 1820. *G. J. Guthrie on Gunshot Wounds, &c. p.* 111, *&c. Ed.* 2, 8*vo. Lond.* 1820. *J. H. James, Obs. on the Principles of Inflammation, p.* 84, 287, *&c.* 8*vo. Lond.* 1821. *Sir Astley Cooper, Surgical Essays, Part* 2, *p.* 186, 8*vo. Lond.* 1820.

MOXA. A soft lanuginous substance prepared from the young leaves of a species of mugwort. It is used in the following way: A little cone of the moxa is laid upon the part, previously moistened, and set on fire at the top. It burns down with a temperate glowing heat, and produces a dark-coloured spot, the separation of which is promoted by applying a little garlic. The ulcer is left to discharge, or is healed up according to the object in view. The moxa is famous in the East for curing several diseases; and the French are much in the habit of using it; but, when English surgeons wish to produce a slough, they generally have recourse to caustics, in preference to actual fire.

M. Roux, when he visited the London hospitals, had two opportunities afforded him of applying the moxa, in order to convince the rising generation of surgeons in this country of its superior efficacy. The first was in a case of spontaneous paralysis of the deltoid muscle at St. Bartholomew's. The moxa was applied a little below the acromion, and a few days afterward the motion of the arm began to be restored. This, however, was a case, which, according to the account of Roux himself, had relapsed, after having been cured by other means. I think one of the surgeons of St. Bartholomew's informed me, that notwithstanding the moxa, the relief proved again only temporary. If, however, the moxa had succeeded, a caustic issue, a blister, or volatile liniments, would probably have answered equally well. The second instance, in which M. Roux applied the moxa, was a case of white swelling at Guy's Hospital; but the disease had advanced too far to allow any hope of a favourable issue. (See *Voyage fait à Londres en* 1814, *ou Parallèle de la Chirurgie Angloise avec la Chirurgie Françaíse, p.* 19, 20.) M. Roux flatters himself that, "*les chirurgiens Anglois répugneront sans doute moins à l'avenir à faire usage du moxa.*" The truth is, English surgeons, as well as English farriers, knew very well before the arrival of M. Roux what might be done with moxa and the actual cautery. But, though the application of fire still prevails in the veterinary art, as a mode of curing diseases, it has long been abandoned as a means of relief in the English practice of surgery: not on the ground of its being always ineffectual; but, because equal good has been found to result from measures, which are milder, always less terrific, and frequently less painful. In order to convince an English surgeon that moxa and the actual cautery ought to be introduced into practice, M. Roux should prove, that there is at least some particular disease, which may in this manner be cured, but which cannot be cured by other means, ordinarily employed in our practice. He should also make us forget, that the application of actual fire was once as common in English surgery as in French; but that it had not attractions enough to maintain its ground.

MURIATIC ACID. *Acidum Muriaticum.* Gargles, containing this acid, are often made use of with advantage in various cases of sore throat, and the disease known by the name of cancrum oris. The following formula is employed at St. Bartholomew's Hospital. ℞. Rosæ rubræ exsiccatæ ʒij. Aquæ ferventis ℔j. Infunde per horam dimidiam, dein cola et adde Accidi muriatici ʒj. Mellis Rosæ ℥ij. Sacchari purificati ʒvj. Misce.

Muriatic acid appears to have been tried in syphilis earlier than the nitric, Dr. Zeller, of Vienna, having employed it as a successful remedy for this disease ever since the year 1789. (*Vid. Sim. Zeller's Prakt. Bemerk über den vorzügl. Nutzen d. allerem. bekannt. Badeschwamens, &c. Nebst. einem Anhange v. d. Salzaüre, &c. Wien.* 1797.)

As a medicine capable of improving the appearance of venereal ulcers, and of restraining for a time the progress of the disease, it has been known to Mr. Pearson many years. He says, that he was first induced to give this acid in venereal ulcers of the tongue, and of the throat, in consequence of the great benefit which he had seen result from its use in examples of cancrum oris: and without viewing it as an antidote for lues venerea, he has frequently availed himself of its useful qualities, when it was desirable to gain a little time previously to the commencement of a mercurial course. (*Obs. on the Effects of Various Articles in the Cure of Lues Venerea, p.* 193, *Ed.* 2.) From what he saw, however, he never inferred that the sulphuric and muriatic acids could radically cure the venereal disease; and he ascribed the benefit derived from them partly to their salutary effects on the stomach and constitution, and partly to their agency on ulcers of the throat and tongue, as local applications. (*P.* 117.) When Mr. Pearson made these observations, the fact, which has now been so unequivocally demonstrated in the army hospitals, that nearly, if not all, the forms of disease, going under the name of syphilis, may be cured without mercury, had not undergone the strict and impartial investigations which have of late years been devoted to the subject. (See particularly *Obs. on the Treatment of Syphilis, with an account of several cases of that disease, in which a cure was effected without the use of Mercury, by T. Rose, in Medico-Chir. Trans. Vol.* 8, *p.* 349.) If this point be admitted as fully established, the question about the antisyphilitic virtues of various articles of the materia medica requires to be taken up in a very different light, not clouded with a notion that the disease will certainly get worse and worse, if no remedy whatever be exhibited, or that it cannot finally get well of itself. While these doctrines prevailed, the amendment of any syphilitic affection during the use of muriatic, or any other acid, was entirely referred to some specific effect, supposed to appertain to such medicine. But now the question involves several considerations; first, the actual virtue of the medicine in expediting the cure of the disease; secondly, the changes which might happen if the complaint were left to itself; and thirdly, the benefit sometimes ascribable to the improvement produced in the constitution, under particular circumstances, by the discontinuance of mercury. The latter mineral no longer claims the name of a specific for the venereal disease, either in the sense of the only, or a completely certain, antidote; because nature herself would in time bring most cases to a favourable conclusion; because the cure can be completed by a variety of other medicines, noticed in this publication; and, lastly, because mercury, though it may be generally the quickest means of cure, is, in particular cases, complicated with much debility and constitutional irritability, the surest medicine for aggravating the complaint, and preventing any progress towards a favourable termination. Here it is enough to know, (and Mr. Pearson himself acknowledges the fact) that in the circumstances above specified, muriatic acid is a safer medicine than mercury. The dose is from ten to twenty drops, which are to be mixed with a proper quantity of water.

Muriatic acid has sometimes been employed as the active ingredient in injections for the cure of gonorrhœa, in the proportion of eight or ten drops to four ounces of distilled water.

In cases of poison from muriatic acid, the experiments made by Orfila lead him to consider calcined magnesia and prepared soap the most fit substances for neutralizing such portion of the acid as may not yet be combined with the texture of the œsophagus, stomach, &c. They should be given as soon as possible after the corrosive poison has been swallowed, care being taken to let the patient drink copiously of warm water, milk, broth, or some mucilaginous diluting liquid. When, from the symptoms, there is reason to believe that inflammation exists in the viscera, or when spasms and convulsions come on, antiphlogistic remedies, and antispasmodics, are indicated. (*Traité des Poisons, p.* 476, *Vol.* 1, *Ed.* 2, *Paris,* 1818.) In order to detect the presence of muriatic acid, when mixed with wine or other fluids, we are recommended to distil a portion of it from a small retort, over a candle, into a phial containing a solution of nitrate of silver. The precipitation of muriate of silver, which is soluble in ammonia, but not in nitric acid, will take place if the poison contain muriatic acid. (*Thomson's Dispensatory, p.* 434, *Ed.* 2.)

By Morveau, who employed himself in investigating the merits of Dr. Carmichael Smith's mode of destroying infection, the muriatic acid, in the new form of gas, was alleged to have the very important quality of neutralizing putrid miasmata. The gas is extricated from common salt by means of sulphuric acid. In this way it is often employed in hospitals as a mode of preventing and obviating infection.

The use of muriatic acid, as an application to certain cases of sloughing, and phagedœna, has been explained in the articles *Hospital Gangrene* and *Mortification.*

MYDRI'ASIS. (from μυδαω, to abound in moisture.) A preternatural dilatation of the pupil.

N.

NÆVUS. (*Congenitæ Notæ; Envies; Mutter-mahl; Mother-spots, &c.*) A mole, or congenital mark, or excrescence of the skin. Nævi materni signify the little spots, excrescences, or swellings, with which many children are born. Some of them (says Dr. Bateman) are merely superficial, or stain-like spots, and appear to consist of a partial thickening of the rete mucosum, sometimes of a yellow, or yellowish brown, sometimes of a bluish, livid, or nearly black colour. To these the term *spilus* has been more particularly appropriated. Others again exhibit various degrees of thickening, elevation, and altered structure of the skin itself, and consist of clusters of enlarged and contorted veins, freely anastomosing, and forming little sacs of blood. These are sometimes spread more or less extensively over the surface, occasionally covering even the whole of an extremity, or one half of the trunk of the body; and sometimes they are elevated into prominences of various form and magnitude. Occasionally, these marks are nearly of the usual colour of the skin; but most commonly they are of a purplish red colour, of varying degrees of intensity; such as the presence of a considerable collection of blood-vessels, situated near the surface, and covered with a thin cuticle, naturally occasions. (See *Bateman's Practical Synopsis of Cutaneous Diseases, p.* 324, *Edit.* 4.) When a nævus is of a dark red colour, its intensity is generally augmented by every thing which tends to accelerate the circulation of the blood. Fits of anger, hot weather, fevers, and the period of menstruation, in particular, are observed to be attended with an increased turgescence and discolouration of the part affected. Indeed the excrescence sometimes bursts, and pours out a dangerous quantity of blood, and in females it has been known to become the seat of a regular menstrual discharge. (*Boyer, Traité des Maladies Chir. T.* 2, *p.* 277; *and John Bell's Principles, Discourse* 9.) Some nævi, especially those usually called *moles,* frequently have long irregular hairs growing upon them; while the surface of others is streaked, and even granulated. Such as appear in the form of a mere red, purplish stain, have been absurdly supposed to arise from a desire for claret, or some other wine of that colour, entertained by the mother of the patient during her pregnancy. The granulated nævi have been compared with raspberries, strawberries, mulberries, &c. for which the mother's longing is ascribed by the vulgar as a cause. The truth is, however, that this doctrine, imputing the origin of nævi to fancies of the mother, is neither consistent with experience nor sound physiology. The causes (as Callisen observes) "potius autem in evolutione primorum flaminum, a naturæ solita via aberrante, uti in aliis rebus monstrosis quærendæ erunt." (*Syst. Chir. Hodiernæ, Vol.* 2, *p.* 201.)

From what has been said, then, it appears that certain nævi are merely cutaneous spots, of a red, violet, or purplish colour, of greater or lesser extent, and with scarcely any perceptible elevation. They are an organic malformation of the skin, the natural texture of which does not exist, but has substituted for it a plexus of vessels, not endued with the natural sensibility of the cutis itself. These nævi generally continue stationary during life, and may be regarded rather as a deformity than a disease. (*Lassus, Pathologie Chir. Tom.* 1, *p.* 477.) Other nævi are either of the same nature as the disease, well known by the name of the aneurism by anastomosis, or bear a considerable resemblance to it. They are sometimes of great size, and their shape is subject to much variety. They are soft and indolent, and of a violet or dark red colour. The skin which covers them is very thin, and, when they are opened, their structure is like that of a spleen, whose blood-vessels are varicose. Some are covered with a delicate white skin, and do not increase with age. Others are more disposed to grow large. These tumours frequently occur in the skin of the face, and in other parts of the integuments, on the inside of the labia pudendi, and cheeks, and in the substance of the upper and lower lip, where they sometimes form a kind of elongation, attended with great disfigurement. Nævi of this kind, so situated in new-born infants, may produce a serious obstacle to the action of sucking. M. A. Severinus has particularly described them under the appellation of "tuberculum atro-cruentum labii inferioris." (*De Abscessuum natura, Cap.* 29, *p.* 803.)

The nævi, which form in the subcutaneous cellular substance, and were named by Petit "loupes variqueuses," (*Œuvres Posthumes, Tom.* 1, *p.* 276.) are also of the same nature as the aneurism by anastomosis. In time, they attain a very large size. Mr. Latta says, he once saw in a child, two years old, a tumour of this kind weighing fourteen ounces, which, at the time of birth was only equal in size to a large bean. During the first year, it did not enlarge much; but it afterward grew rapidly to the size already specified. (*System of Surgery, Vol.* 2, *Chap.* 22.) Lassus has even seen a tumour of this description as large as a man's head. (*Pathologie Chir. Tom.* 1, *p.* 479.) Having treated particularly of the "aneurism by anastomosis," in another place, (see *Aneurism*,) I shall merely repeat the necessity there is for cutting every particle of the disease away, every portion of the congeries of vessels and cells of which it consists, whenever it is meddled with at all. Puncturing the swelling, or the partial removal of it, has cost many persons their lives by hemorrhage, as the records of surgery fully prove. (*Petit, Traité des Maladies Chir. T.* 1; *Lassus, Pathologie Chir. T.* 1, *p.* 484, *&c.*)

Although the original causes of nævi are buried in obscurity, experience proves, that whatever produces irritation in the part affected, or an increased determination of blood to it, has generally the effect of accelerating the growth and enlargement of the swelling. Thus, a trifling bruise, or a tight hat, will sometimes excite a mere stain-like speck, or a minute livid tubercle, into that diseased action, which occasions its growth. (*Bateman's Pract. Synopsis, &c. p.* 327, *Edit.* 3.)

With regard to the treatment of nævi, the subject may be explained in a few words. When these marks, or swellings, are superficial, without any disposition to enlarge, or spread, and their trivial elevation does not expose them to accidental rupture, there appears to be no good reason for interfering with them. Indeed, they could only be destroyed with caustic, or the knife, and these severe means would leave scars, accompanied with nearly the same degree of disfigurement.

But, as a valuable writer observes, when nævi evince a tendency to enlarge, or are very prominent excrescences, and either troublesome from their situation, or liable to be ruptured, either their growth must be repressed by sedative applications, or the whole congeries of vessels extirpated with the knife. Mr. Abernethy has proposed the application of cold washes, and the pressure of a bandage. This practice was found by him in several instances to have the desired effect of checking the growth of the tumours, which afterward shrunk, and became no longer objects of any consequence. (See *Abernethy's Surgical Works, Vol.* 2, *p.* 224.) Boyer also knew of a case, in which a nævus of the upper lip was cured by the mother pressing the part with her finger unremittingly for seven hours at a time, and the use of alum wash. (*Traité des Maladies Chir. T.* 2, *p.* 269.) Boyer, however, is not generally an advocate for this mode of treatment; and Dr. Batemen expressly states, that, in the majority of cases, pressure is the source of great irritation to these maculæ, and cannot be employed. (*P.* 329.)

For all those examples, which partake of the nature of aneurism by anastomosis, and are disposed to grow, the best general mode of cure is extirpation with the knife. The prudence of this practice, and the necessity of taking away every particle of the disease, has been already explained: this is what was advised by F. Hildanus, (*Cent.* 5. *Obs.* 46.) what was strongly urged by the celebrated Petit, (*Œuvres Posthumes, T.* 1.) what was recommended in still more animated terms by Mr. John Bell, (*Principles of Surgery, Discourse* 9.;) and it is what is particularly insisted upon in another part of this Dictionary. See *Aneurism.*

In general, stimulating applications cannot be made to nævi, without risk of exasperating, instead of lessening them. Mere thickenings, and discolourations of the rete mucosum, however, have sometimes been removed by a mixture of spirit and the liquor potassæ. (*Bateman, p.* 330.)

Formerly caustic was much in vogue for the removal of nævi; but, unless its action extend deeply enough to destroy every part of the disease, it may cause a dangerous degree of irritation, copious hemorrhages, and a sudden and fatal enlargement of the tumour. Therefore, as it is a more painful measure than the knife, and less certain in its effects, it should be on every account discarded from practice. It cannot be denied, however, that the old surgeons had success with their caustics, where the nævi were altogether superficial. Thus, in speaking of caustic remedies, Callisen observes: "inter quæ eximio cum successu adhibetur sapo cum æquali parte calcis vivæ subtilissimæ commixtus, nævo per emplastrum perforatum admovendus, et alio emplastro imposito firmandus; hoc remedio eschara inuritur, qua soluta, cicatrix alba remanere solet." (*Syst. Chirurgiæ Hodiernæ, Vol.* 2, *p.* 202.)

Consult *Petit's Œuvres Posthumes, T.* 1. *Lassus, Pathologie Chir. T.* 1, *p.* 476, *&c. Ed.* 1809. *Callisen's Systema Chirurgiæ Hodiernæ, Vol* 2, *p.* 201, *Hafniæ*, 1800. *Abernethy's Surgical Works, Vol.* 2, *p.* 224, *&c. Latta's System of Surgery, Vol.* 2. *Chap.* 22. *J. Bell's Principles of Surgery, Vol.* 1, *Discourse* 9. *Boyer, Traité des Maladies Chirurgicales, T.* 2, *p.* 225, *&c. Paris*, 1814. *A Practical Synopsis of Cutaneous Diseases by T. Bateman, M. D. Edit.* 3, 1814. *Delpech Précis Elémentaire des Maladies Chir. T.* 3, *p.* 244, *Paris*, 1816. *J. Wardrop, On one Species of Nævus, with the Case of an Infant, where the Carotid Artery was tied, in Med. Chir. Trans. Vol.* 9, *p.* 199, *&c.*

NECROSIS. (from νεκροω, to destroy.) This word, the strict meaning of which is only mortification, is, by the general consent of surgeons, confined to this affection of the bones. It was first used, in this particular sense, by the celebrated M. Louis, who restricted its application, however, to examples, in which the whole thickness of a bone was destroyed. (See *Mém. de l'Acad. Royale de Chirurgie, T.* 5, 4*to.*) By the ancients the death of parts of bones was not distinguished from caries. However, necrosis and caries are essentially different; for, in the first, the affected part of the bone is deprived of the vital principle; but this is not the case when it is simply carious. Caries is very analogous to ulceration, while necrosis closely resembles mortification of the soft parts.

Between caries and necrosis, says Weidmann, there is all that difference, which exists between ulcers and gangrene, or sphacelus of the soft parts. In caries, the nutrition of the bone is only impaired, and an irregular action disunites the elements of the bony structure, which consequently sustains a loss of substance; but every remaining part of it is yet alive. In necrosis, on the contrary, the vitality and nutritive functions cease altogether in a certain portion of the bone, the separation of which then becomes indispensable. (*De Necrosi Ossium, p.* 7.)

I have mentioned that M. Louis confined the term necrosis to cases, in which the whole thickness of a bone perished; but Weidmann judiciously criticises this limitation of the word, and maintains, that the nature of the disorder is the same whether it affect a single scale, the whole, or a mere point, of the bone. He also objects to the definition of necrosis proposed by Chopart, (*Dissert. de Necrosi Ossium, Paris,* 1766,) and adopted by David. (*Obs. sur une Maladie connue sous le nom de Nécrose, Paris,* 1782.) These two authors have defined necrosis to be a disorder, in which a portion of bone perishes, and turns dry, in order to be soon separated from the living parts, and replaced by a new bony substance, which is to perform its functions. But as Weidmann observes, it may happen, that a piece of bone, which dies and separates, may not be replaced by any new formation of bone, though the disease is of the same character, and merely varies in some modifications. He therefore argues, and every rational surgeon will agree with him, that a true necrosis must always be said to exist, whenever a dead portion of bone has either separated, or is about to separate. "*Vera demum necrosis semper est, si aliquod ossis ramentum, in quo vis vitæ extincta est, abscessit, vel proxime abscessurum, est.*" (*P.* 7.)

The tibia, femur, lower jaw, clavicle, humerus, fibula, radius, and ulna, are the bones most frequently affected with necrosis. Excepting the lower jaw and scapula, the process of regeneration has only been noticed, in the cylindrical bones. From 12 to 18 years of age, is the time of life, most subject to necrosis. The necrosis of the lower jaw, however, seldom occurs before the age of 30. In some persons, the bones are affected at once, owing to constitutional causes.

No climate, age, sex, mode of life, nor condition, (says Weidmann) is exempt from this disorder. Childhood and puberty, however, are the periods most liable to it. The same thing may be said of persons, who labour hard, and are much exposed to external injuries. Every bone of the human body is subject to necrosis; but those which are superficial, and enter into the formation of the extremities, are more frequently affected than others whose situation is deeper. Necrosis less commonly attacks the spongy substance of the bones, because this being endued with a higher degree of vascularity and life, suppuration is most apt to occur. Necrosis, on the contrary, is oftener seen in the compact substance, where the vital principle is less energetic, and more readily extinguished. Lastly, the disorder may affect the long bones, or the broad; the large or small; and even those of the very least size; since it is well known, that the ossicula of the ear may be destroyed by necrosis, and separate. I have seen this happen in two instances, and the fact is recorded by several writers. (See *Astruc de Morbis Venereis, lib.* 4, *cap.* 1. *Henri, Journal de Medécine, T.* 15, *p.* 363.)

Though necrosis mostly attacks the cylindrical bones, the flat ones are not exempt from the disease. Pott makes mention of a parietal bone, the whole of which was detached, and of an os frontis, the greatest part of which came away. In a thesis on necrosis, in 1776, *aux écoles de chirurgie,* may be found the case of a young man, a very large part of whose scapula perished and separated. Chopart, who relates the case, mentions, that he saw the patient quite recovered, and felt a new triangular moveable bone, firmly supporting the clavicle, but smaller and flatter than natural, and without any spinous process. The same has happened to the lower jaw, as may be seen by referring to the *Ephemerides Nat. Cur.* and *Mém. de l'Acad. de Chirurgie.* In the fifth volume of the latter work, is an account of a woman, who applied to be relieved of some venereal complaints. From the beginning of the treatment, the bone was discovered to be loose just under the gums, and seemed shortly afterward, to move backwards and forwards with a tooth. M. Guernery took hold of the tooth with a key-instrument, and found it firmly inserted in the moveable jaw; he made with caution the necessary manœuvres for extracting the portion of bone; but was greatly surprised on finding what an extensive part yielded to his very moderate efforts. It was the whole of the lower jaw, above its right angle from its division into the coronoid and condyloid processes to the space between the first and second of the front grinders of the left side. On the right, there only remained the condyle in the articular cavity of the temporal bone. This destruction left a considerable empty space, from which great deformity was apprehended, in consequence of the unsupported soft parts falling down. The woman, however, got well in two months, and had the most perfect use of a new jaw. A similar fact is recorded in the *Journal de Médécine,* 1791.

When the body of a cylindrical bone, or the middle portion of a flat bone, is destroyed by necrosis, their extremities, which are of a cellular texture, continue unaffected, so that, for example, in the cylindrical bones, the articular ends are always formed of portions of the original bone, which are engrafted, as it were, on the new production. There are, however, a few bad cases, in which the necrosis does not altogether spare the heads of the bones, and the disease communicates with the joint. These examples are very uncommon, and are attended with considerable danger to the limb; indeed, they generally require amputation. (See *Boyer, Traité des Mal. Chir. T.* 3, *p.* 442.) Mr. Brodie has known an instance, in which, without any obvious cause, a large portion of the head of the tibia died, and exfoliated, and the destruction of the knee-joint was the consequence. (*Pathol. and Surg. Obs. on the Joints, p.* 269.)

Besides the differences arising from the particular bones affected, necrosis also varies, according as the portion of bone attacked happens to be thin, and of little extent, or large and of considerable thickness. The disease is *simple,* when it is confined to one bone, and the patient is in other respects healthy; *compound,* when several different parts of the same bone, or several distinct bones, are affected at the same time; when the health is bad; and other parts of the body are also diseased. It should also be known, because the information is of practical importance in the treatment, that necrosis has three different stages, or periods. In the first, the bone affected perishes; in the second, the process of exfoliation or separation of the dead bone from the living, is going on; and, in the third, the separation is completed. (See *Weidmann, p.* 8.)

The causes of necrosis are not essentially different from those which produce ulcers and gangrene of the soft parts. As, however, the vitality of the bones are weaker, we may infer, that necrosis may be occasioned in them by causes which are less numerous and intense, and such as would only give rise to suppuration in the soft parts. Every thing, whether in the periosteum or the substance of the bone itself, that tends to interrupt the nutrition of the bone, must be regarded as conducive to the origin of necrosis. It is observed, however, that when the mischief in the periosteum, medulla, or substance of the bone, is of trivial extent, the consequence is merely an abscess. Some of the causes of necrosis are *external,* while others are *internal,* or constitutional. Sometimes the life of the bone is instantaneously destroyed by them; but in other instances, the bone is first stimulated and enlarged, so that its death is preceded by true inflammation.

The external causes, which injure the periosteum and medullary structure, and thus produce necrosis, are wounds, contusions, pressure, fractures, comminutions, acrid substances, caustics, and extreme degrees of heat or cold.

When the periosteum, in consequence of an external cause, inflames and sloughs, or is at once deprived of its vitality, as it may be by the action of caustic, fire, or intense cold, the vessels which conveyed nourishment to the bone are destroyed, and the death and exfoliation of the denuded portion of the bone are inevitable. But, if the detachment of the periosteum is of little extent, the patient young and healthy, and the treatment calculated to prevent inflammation, and preserve uninjured the vessels distributed to the bone, hopes may be entertained that no part of the bone will die, but that granulations will very soon arise from its surface, being adherent to it as the periosteum was, and that they will grow to and cicatrize with the surrounding parts. Weidmann has explained, that this fact of bones not always exfoliating when deprived of the periosteum, which is of great practical importance in the treatment of wounds, was inculcated by Felix Wurtz, Cesar Magatus, and Belloste, at a time when the contrary opinion prevailed. Weidmann also adverts to his own experience and to the experiments of Tenon, in further proof of the preceding fact. (*Mem de l'Acad. des Sciences,* 1758, *p.* 372.)

On the other hand, when the detached piece of the periosteum is extensive; when the bone itself is contused; or when it has been long exposed to the air, the effect of which is to dry up the few vessels which belong to it; when the inflammation is violent and extensive; when the patient is old, decrepit, or of bad constitution; and more especially when improper applications are used, as was almost always the case in former times; necrosis cannot be avoided.

An internal necrosis, affecting the spongy texture of bones, generally arises from constitutional causes, though sometimes an external cause, which seems to affect only the surface of a bone, extends its action to the interior, so as to destroy the medullary membrane, and produce an internal necrosis.

In external injuries of the head, where the pericranium is lacerated, contused, or otherwise hurt, or where the outer table, or the diploe, of the skull, is injured, the inflammation frequently extends to the inner table, and the dura mater becomes detached. Hence, a collection of matter forms, which may occasion many bad symptoms, and even death itself; or if the patient survive, exfoliation of part of both tables of the skull is the consequence. (See *Pott's Chir. Works, London,* 1779, *Vol.* 1, *p.* 32.)

The same thing may occur in other bones, as well as those of the cranium. Bromfield had an opportunity of seeing a necrosis of the spongy substance of the upper and internal part of the tibia, brought on by the improper mode in which an issue was dressed. In order to keep the peas from slipping out of their places, a compress with a shilling in it, and a tight bandage were applied; but the part was attacked with excruciating pain, and the spongy texture of the tibia in the vicinity became affected with necrosis. (*Chir. Observations and Cases, Vol.* 2, *p.* 9.)

This circumstance, as Weidmann observes, ought not to surprise us: as numerous vessels quit the periosteum to descend into the substance of the bone, to ramify on the medullary cells themselves, and freely anastomose there, it cannot be difficult to conceive, how inflammation, which is at first confined to the outside of the bone, may (through the medium of the vessels which serve as conductors to it) penetrate more deeply, and extend its ravages in every direction.

But necrosis may proceed from another description of causes, which are of a constitutional nature. In fevers of bad type, in the small-pox, and in the measles, experience has fully proved, that the bones are sometimes attacked with necrosis. Scrofula, lues venerea, and the scurvy, are also diseases, which, according to the testimony of all surgical writers, frequently produce such mischief in the bones as terminates in necrosis. It is likewise well ascertained, that mercury, the judicious employment of which in venereal cases will prevent necrosis, or cure them when formed, may itself give rise to the disorder, especially in the lower jaw-bone. (See *Mém. de l'Acad. de Chir. T.* 5, *p.* 356, 4*to.*)

This happens either in consequence of mercury having been introduced too quickly into the system, or because the patient exposes himself to cold, or deviates in some other respect from a proper regimen. Certain necroses of the lower jaw, however, appear also to have been caused by blows, and the application of acrid substances to carious teeth. But, says Weidmann, "I feel it incumbent upon me particularly to declare, that the irrational treatment pursued by the ancient practitioners, who neither understood the nature of the bones, nor the differences of their diseases, and which treatment is too confidently adopted in our own days, had frequently the effect of killing these parts, by attacking with spirituous, acrid, or caustic remedies, or even with the knife, diseases which required the mildest applications, and to be left in a great measure to nature. The old surgeons were afraid of laying on the exposed injured surface of a bone unctuous emollient dressings, and yet, for what reason I know not, they subjected the part to the action of spirituous, acrid, drying applications. As for myself, I deem it proved by infallible and frequently repeated trials, not only that an exposed injured bone may be dressed with a mild ointment without any ill consequences, but even with the greatest advantage. Why should that which is beneficial to the soft parts, be so prejudicial to the bones? In ulcers of the soft parts, indeed, the employment of the remedy which I recommend, is less important, because these parts are naturally humid, and there is no risk of their becoming dry. But with regard to the bones, whose dry texture is only penetrated by few vessels, which may easily be destroyed if they be suffered to become quite dry, it is absolutely necessary to use an emollient ointment, as a dressing, well calculated to defend these vessels, which are the support of life, and preserve them from the bad effects of exposure to the air. Therefore, observes Weidmann, if a surgeon would avoid producing a necrosis himself, and not neglect any means that tend to prevent such disorder, *he should make it a rule never to apply any thing acrid to exposed bones, but, on the contrary, to defend them with a dressing of some unirritating ointment.*" (*De Necrosi Ossium, p.* 11.)

It was formerly supposed, that purulent matter, collected near a bone, might in time become acrimonious, corrode the bone, and produce necrosis. Hence, it was a rule to open such an abscess as soon as its existence was known. But Weidmann questions whether there was any real necessity for this practice. No doubt, says he, the preceding erroneous opinion arose from the circumstance of the bones being often found bare, carious, or even affected with necrosis, when abscesses were near them; but things happened thus, because the inflammation which caused the suppuration, had also extended its effects to the periosteum and bone. He affirms, that he has witnessed ulcers, in which the surface of bones, bare and uncovered by the periosteum, lay bathed in pus for a very considerable time; yet, being dressed with a mild ointment, they continued entire, granulations grew from them, and cicatrization followed. He had also in his possession portions of bones affected with necrosis, which had lain for years in pus; still their surface was smooth, and presented no marks of erosion. If then these pieces of bone underwent no alteration, how much less likely to do so are bones, which are endued with life!

But though Weidmann wisely rejects the doctrine of pus being capable of destroying the periosteum and bones by any corrosive qualities, he acknowledges his belief, that the matter of an abscess may by its quantity compress and inflame the adjacent parts, and occasion their removal by the absorbents. While the periosteum intervenes between an abscess and the bone, he does not see how the latter can be hurt by the pus; but when the abscess is copious and lodged between that membrane and the bone, the vessels passing from the former will be destroyed, and either caries or necrosis ensue.

The inflammation arising from the causes which excite necrosis, may be either *acute* or *chronic.* It is chronic, when it begins and passes through its different stages slowly, and when the mildness of the symptoms may lead us to mistake the nature of the case. This sort of inflammation chiefly happens in debilitated constitutions, in which the necrosis only affects the external part of a bone, and originates from some chronic cause, such as scrofula, lues venerea, and the scurvy. But when necrosis attacks the interior, and the disease occurs in a strong, irritable, plethoric subject, inflammation is immediately kindled, attended with the most acute symptoms, severe pain, considerable fever, restlessness, delirium, &c. Chronic inflammation is more supportable; but its duration is longer: acute inflammation is more afflicting, but sooner comes to a crisis.

The part in which a necrosis is situated, is affected with swelling. What has been observed, respecting the inflammation, is also applicable to this tumour, which most frequently forms gradually, but sometimes with great rapidity. In the first case, the accompanying pain is dull and inconsiderable; in the second, it is violent. The swelling has not, like that of abscesses, an elevated apex. On the contrary, it is so widely diffused, that the limits which circumscribe it, can hardly be distinguished.

This diffusion of the swelling is the greater, in proportion as the diseased bone is more deeply buried in soft parts: it may extend over the whole morbid bone, or even over the whole limb.

The swelling comes on at the very beginning of the disorder, and continues to increase, until the matter which it contains finds its way out, when the evacuation is followed by a partial subsidence of the tumour. The swelling is sometimes also combined with œdema, especially in persons whose constitutions have been impaired by the severity of the disease, the violence of the sufferings, and the long and profuse discharge.

When the inflammation is acute, purulent matter of good quality soon collects in the vicinity of the necrosis. In the contrary case, the pus forms slowly, and is thinner and less healthy.

The abscess which accompanies a necrosis, naturally soon bursts when it arises from intense inflammation, and is situated near the skin, which is itself inflamed. But when the bone is surrounded by a great thickness of soft parts, and the inflammation is chronic, the quantity of matter daily increases, the cavity which it occupies becomes larger and larger, and considerable pressure is made in the abscess on every side. The bones and tendons resist for a long while the progress of the matter; but the cellular substance yields, and different sinuses form, which sometimes run to a vast distance from the main collection of matter, especially when the abscess lies under an aponeurosis.

It was supposed a few years ago, that in cases of necrosis, the matter was invariably sanious, acrid, and fetid. But the celebrated Weidmann exposed the error of this opinion. He had often seen abscesses and ulcers, arising from necrosis, discharge a whitish, inodorous, thick pus, absolutely devoid of any bad quality whatsoever. He had particularly seen this happen in patients whose necroses proceeded from an external cause, or an internal one of a slight nature, and whose health was generally good. (*De Necrosi Ossium, p.* 16.) If, says the same excellent writer, we sometimes find in practice the suppuration dark and fetid, we must not ascribe it to the affection of the bone, but to the weakness and bad state of the patient's health. Under the same circumstances, common sores of the soft parts would also emit a discharge of bad quality.

After the ulcerated openings have emitted for some time a profuse discharge, the sinuses, if considerable, receive the appellation of fistulæ, on account of their edges putting on a callous appearance, throwing out fungous granulations, and there being impediments to cicatrization. These impediments are caused by the dead portions of bone, which, whether loose or adherent, act as extraneous bodies in hindering the sores from healing. In some instances also, the ulcers will not heal though the dead bone has come away, because they run to a great depth, and such a quantity of pus is secreted from every point of their surface, as prevents all contact, and the adhesions which would result from it.

The fistulæ vary in number; but they are fewer in proportion as the disease is slighter. In an extensive necrosis, several of these openings are seen, either near together, or separated by considerable spaces; and, when the necrosis affects every side of the bone, the fistulæ in the integuments occur on every side of the limb.

Besides the inflammatory fever, which attends the beginning of every severe case of necrosis, which is sometimes accompanied with exceedingly violent symptoms, and which usually abates when matter is formed, the patient is subject to another fever of a slow hectic type. This takes place in the decline of the disease, is the effect of the long-continued profuse suppuration, gradually reduces the patient, and at length brings him to the grave, unless the timely removal of the sequestrum be effected either by nature or art.

Let us next endeavour to trace the signs, by which we may not only ascertain the presence of the disease, but its modifications.

In the first place, we should make ourselves acquainted with every thing, which may have predisposed to the disorder; as, for instance, what accidental circumstances have occurred, and what symptoms followed them. We should also inquire into any previous treatment which may have been adopted; for, as Weidmann truly remarks, injudicious remedies have caused many a necrosis that would not have occurred at all, if the case had been properly treated, or confided to nature.

The kind of inflammation with which the disease commences, may afford grounds for suspecting that necrosis will happen: it is generally slow and deeply seated, passing through its stages tardily, and the attendant symptoms are severer. The skin retains its natural colour a long while; but, at length, exhibits a reddish, or livid discolouration. The matter does not reach the skin till a considerable time has elapsed, and when the abscess bursts, the inflammatory symptoms are still slow in subsiding. When the inflammation is acute, the patient suffers intolerable pain a long time.

There are also other symptoms of a necrosis; viz. the swelling which accompanies the inflammation, is situated upon a bone, or rather the bone is included in the tumour; the swelling is at the same time very diffused; and the suppuration lies deeply, and can only be felt in an obscure way.

The ulcers, beneath which a necrosis is situated, discharge a large quantity of matter, and their edges are bent inward. The granulations are either yellowish and pale, or else of an intense red colour; they are also irregular, and generally not very tender, though sometimes extremely painful, and on being slightly touched, they bleed.

It has been already noticed, that, some years ago, the discharge from the sores, which attend necrosis, was described as being always thin, fetid, and sanious; and such qualities of the matter were regarded as a symptom of the disease of the bone. But that excellent practical writer, Weidmann, has well explained, that it is a symptom undeserving of confidence. In cases of necrosis the pus is often thick, white, and inodorous; while other ulcers, unattended with diseased bone, sometimes discharge thin fetid matter. Weidmann, at the same time, does not mean to assert, that in cases of necrosis the sores never emit unhealthy pus; but he firmly believes, that such discharge is not always the result of a disease of the bone. As far as he could judge, the suppuration from ulcers, situated over diseased bones, continues white and laudable as long as the patient's general health is good; but, that it deviates from these properties, in proportion as the health becomes impaired.

Neither is the black colour, imparted to the dressings of ulcers, a circumstance which necessarily indicates the existence of necrosis; for it may occur when the bone is sound, and may not happen when the bone is affected.

None of the preceding symptoms convey such information, as leaves no doubt of the positive existence of necrosis. The touch is the only thing which can give us this knowledge, when the bone is not too deeply situated, and the sinuses not tortuous, nor obstructed with fungous growths.

When the openings of the ulcers are considerable, the finger may be introduced. If in this way the bone can be felt to be extensively uncovered by the periosteum, the surgeon may conclude that all such portion of the bone has perished. He may be still more certain of the fact, when he finds the edges of the denuded bone unequal and rough.

The examinations, made directly with the finger, give the most correct and exact information of the state of the bone; but the orifices of the sores are sometimes so small, that the finger cannot be introduced without causing great pain. A probe must then be used for the purpose of ascertaining the extent of the denudation of the bone; whether its edges are rough; whether the dead portion is loose, and likely to separate soon.

Sometimes the dead fragment of bone protrudes from the ulcer, or is visible on separating its edges. When it is black, there cannot be a doubt of its being actually dead; but, on the other hand, when its whiteness is increased, the diagnosis is difficult, because bones being naturally white, much experience is necessary to be able to judge whether they are so in excess.

It merits attention, also, that the black colour of the bone is not owing to the necrosis itself, but seems rather to depend upon the fragment having been exposed to the air. In fact, dead pieces of bone with which the air comes into contact, turn black, while those which are covered with matter, retain their whiteness. The cylindrical portion of a humerus, which was almost totally affected with necrosis, was universally black at the part, which protruded through the flesh; but the rest, which lay under the integuments, remained white. (*Weidmann de Necrosi Ossium*, p. 19, *et Tab.* 9, fig. 1.)

When the early symptoms of the disease are mild, the surgeon may infer that it is only a superficial portion of the bone which is about to be separated. But this judgment will be more certain if confirmed by examination with the finger or probe; or, if the swelling which occurred in the beginning, has not spread beyond the affected point, and if the pain affects only the outer part of the bone. In this sort of case, there is also great probability that the dead bone will be separated within a moderate time.

It is also of importance to ascertain the existence of an internal necrosis, and to learn whether it is situated in the spongy substance, or in the internal parietes of the canal of the bone; whether it affects only a part, or extends to the whole body of the bone. When there is an internal necrosis, says Weidmann, the disease is generally more aggravated, and of longer duration; and in the first stage, the patient is affected with severe symptoms, intolerable pain, loss of rest, ardent fever, profuse perspirations, and such disorder of the system, as may prove fatal, unless the patient be young and strong. The hard swelling which was observable at the commencement of the disease, increases but slowly, and extends very gradually over the circumference of the limb, while the skin yet remains free from redness and tension. *If the part be somewhat roughly handled, the pain, which is fixed in the bone, is not rendered more acute, as would happen, were the case an external inflammation.* In this suffering condition the patient continues a good while, before the formation of matter brings a degree of relief. When the matter is formed, it spreads through the adjacent cellular substance, among the muscles and other parts, and the abscess generally bursts after a considerable time, by several openings, very distant from the main collection of matter, as also remote from each other, sometimes in diametrically opposite situations. The evacuation of the matter, however, does not produce any material subsidence of the swelling. The pus is of good quality, and issues in large quantities from the ulcerated apertures, *the quantity, however, not being increased, when pressure is made.* If some of the openings heal, others are formed; but, in general, the edges become callous, and they lose all disposition to cicatrize. When the case presents the foregoing circumstances, and the weakened limb can neither bear the action of the muscles, nor the weight of the body, and by either of these causes, its shape becomes altered, the surgeon may conclude that the disease is an internal necrosis. But, in order to avoid mistake, he should introduce into the sinuses a probe, which, passing through the openings in the subjacent bone, will touch the dead piece, which it contains, and which will sometimes be even distinguished to be loose and moveable. *The extent of the sequestrum must be judged of by the extent of the swelling, and the distances between the apertures in the bony shell, which includes the sequestrum.*

The surgeon should also endeavour to ascertain with the probe, whether there is only a single sequestrum, or several. When there are several, they may be felt with the probe in different places, down to which this instrument is passed, and the removal of one or two of the fragments is not followed by a cure. It ought to be remembered, however, that the same fragment may be touched by the probe in several different places, when it is very extensive. If there are several dead pieces of bone, situated at a distance from each other, each of them is generally accompanied with a distinct swelling, and sinuses. Frequently, these fragments are so concealed, that they cannot be felt with a probe; but, their existence may then be suspected from the ulcers not healing, which can be ascribed to nothing else.

It is also necessary to distinguish with the greatest attention the different stages of the disease. The *first stage* may be considered as existing, when the attack is yet recent, and the inflammation and its concomitant symptoms, the pain, swelling, and symptomatic fever, prevail in a high degree, and when no suppuration has taken place, or at least no discharge of matter. The *second period,* in which the dead bone is undergoing the process of separation, is indicated by a diminution of the inflammation, a partial subsidence of the swelling, and the discharge of purulent matter. When a probe is passed into the ulcers, the bone is felt bare, and dry, and, towards the limits of the swelling, it is rough, where, as will be afterward noticed, an excavation is formed. Every part of the bone, however, which is to be detached, still continues adherent to the rest of the living bone. At length, the surgeon knows, that the disease has reached its *last stage,* or that in which the dead portion of bone is entirely separated, when sufficient time for the completion of this separation has expired, and when the dead bone can be distinguished with the finger, probe, or even the eye, to be loose and free from all connexions.

Although a necrosis must generally be classed with diseases which are serious and of long duration; yet, the character of the disorder is not essentially bad, since it is often cured by nature, or with the assistance of surgery. Confident hopes of a cure may be entertained when the necrosis is confined to the external part of a bone; when it is simple and of moderate extent; when it is not situated in a bone, destined for important uses, or near any viscus, or organ, that may be injured by it; and when it proceeds from an external cause, and the general health is good. On the contrary, the cure is difficult, and the prognosis doubtful, when the disease is extensive, and complicated with other affections, either of the same, or different bones: when it attacks bones, which are of high importance on account of their functions, or situation; when it is situated in the interior of the bone, and affects several parts of it; when it arises from an internal cause, for which there is no certain and quick-acting specific; when the patient is weakened by age, or disease; and especially, when the sinuses extend into the neighbouring articulations. (*Weidmann de Necrosi Ossium, p.* 22.)

The process of cure is said to take place with more celerity in the lower jaw, than any other bone, and may be completed in three months. Mr. Russell has never known a necrosis of the tibia get well in less than a year; but, in general, nearly two years elapse first; sometimes, the cure is protracted to a much greater length of time.

Necrosis of the lower jaw and clavicle never proves fatal: that of the lower extremities, which is the worst case, does so very seldom, and only from the violence of the first inflammatory symptoms, which rapidly bring on a hectic fever, which proves incurable, unless its local cause be removed by a timely amputation. When the violence of the first stage, however, has abated, the irritation ceases, and the hectic symptoms, if there are any, are generally moderate. Nor is this state of tranquillity disturbed, till the sequestrum, in making its way outward, again produces irritation. At this second period of urgency, extensive inflammation may originate, ulcerations spread all over the surface of the limb, assume an unhealthy appearance, violent fever succeed, and the patient either perish, or sink into a state, in which he must consent to amputation, as the only means of saving his life. This is the last crisis of imminent danger; but, in general, it is less perilous, than when the inflammation comes on in the incipient stage of necrosis. (*Russell.*)

In the treatment of necrosis, the first grand object of the surgeon should be to aid nature in her endeavours to effect a cure, and not to disturb her operations by any superfluous, or unseasonable interference. The second should be to assist her sometimes by the boldest proceedings, when she loses her way, and cannot by herself accomplish the end.

But, in order not to attempt any thing wrong, the surgeon must understand correctly what nature does in this disease, what it is in her power to perform; what she either cannot accomplish at all, or not with any degree of certainty; and lastly, the circumstances in which she may err, and endanger the patient's life.

When a portion of bone dies, nature uses all her endeavours to bring about its separation from the part of the bone which still remains alive. Surgeons have denominated this process, *exfoliation*, (see *this word*) which resembles the separation, that occurs between parts affected with gangrene and sphacelus, and the living flesh. An exfoliation of bone, however, happens much more slowly, than the separation of a slough of the soft parts. Neither are all exfoliations completed at a regular period; for they proceed most quickly during youth, when the constitution is usually more full of energy, the bones more vascular, and less replete with solid inorganic earthy matter. On the other hand, the process is slower, in old, debilitated subjects, whose vitality is less active. A thin small scale of bone separates sooner, than a large thick portion; and the most tedious exfoliation is that of a thick bone, from which a portion, including its entire diameter, is coming away. The separation of a necrosis takes place more expeditiously in bones of a light texture, than in those of a solid structure; and sooner, in the less compact parts of bones, such as the epiphyses and spongy substance, than in those of greater density.

When a necrosis has originated from the scurvy, syphilis, &c. and appropriate remedies are not administered, nature cannot effectually accomplish the process, by which the dead bone is separated; the case becomes worse; and life endangered.

The separation happens precisely at the different points where the living and dead parts of the bone come into contact; and it is obvious, that the particles of the dead bone, which are at a distance from the part that retains its vitality, cannot be acted upon by it.

A variety of opinions have been entertained, concerning the means employed by nature in effecting this separation. Hippocrates believed, that the dead part was pushed away by a fleshy substance, which grew underneath it. (*De Cap. vuln. Cap.* xxiv.) Ludwig, Aitken, Bonn, and many others, adopted the same idea. (See *Adversaria Med. Pract. Vol.* 3, *p.* 63; *Systematic Elements of the Theory and Practice in Surgery, p.* 287. *Thesaur. Oss. Morb. p.* 1.)

Van Swieten conceived, that the dead part was forced away by the incessant beating of the arteries. (*Comment. in Aphor. Boerrhavii,* § 252.) M. Fabre ascribed the separation to the extension and expansion of the vessels. (*Mém. de l'Acad. de Chir. Tom.* 4, *p.* 91.) Others supposed that the exfoliating piece of bone became loosened partly by the suppuration, and partly by the rising of the new granulations. (See *B. Bell on Ulcers.*)

As Weidmann observes, there is unquestionably a reddish fleshy substance formed between the dead and living bone, and which Celsus has noticed under the appellation of caruncula. (*De Medecina, lib.* 8, *cap.* 3.) But, it would be erroneous to refer the expulsion of the dead portion of bone to it, since it can never be produced, before a change has taken place in the structure of bone, there being in fact no space for it to grow in; and hence, it is never seen before the disunion of the parts has considerably advanced. There must consequently be some other power, which destroys the cohesion between the dead and living bone, and produces the groove, or interspace, in which the soft granulations arise. Besides, among other facts proving the falsity of the idea, that the granulations push off the dead bone, Weidmann particularly adverts to the occasional exfoliations of the whole circumference of a cylindrical bone. Here, if the granulations had the power of causing a disunion on one side, they could not have the same effect on the opposite one; but would tend to make the contact more intimate.

The separation also cannot be made by the pulsation of the small arteries, nor by the weak expansive motion of the vessels of the bone. Weidmann knows not what motives have induced certain writers to impute the effect to suppuration, and observes, that as the doctrine is not founded upon reasoning, it is superfluous to offer any arguments against it. If the least attention be paid to what nature really tries and accomplishes in this operation, nothing will be more manifest, than that it is completed in a very different manner. Swelling first affects the periosteum and bone, which by degrees softens. (*Vid. Troja passim. Bonn. Thesaur. Oss. Morbos, p.* 122, *and Weidmann de Necrosi Ossium, Tab.* 4, *Fig.* 1, *and* 3.) At the margins of the necrosis, the bony surfaces, which were smooth, become rough, and irregular. A fissure is there produced, which extends in every direction under the piece of bone, that is about to be detached. The bony texture is also daily rendered less solid, so that the number of adhesions between the dead and living parts diminish, and in the end are totally destroyed. Weidmann then explains, that the true mode by which the separation is effected consists in the absorption of the particles, situated betwixt the living and dead parts of the bone, in such a way, however, that the first loses a great deal of its substance; the last, scarcely any thing. (*P.* 25.) After the dead bone has come away, the swelling of the periosteum subsides, and the living bone recovers its original hardness and solidity. (*Troja, p.* 67.)

For a further account of the process, by which dead portions of bone are separated from the living, see *Exfoliation.*

When dead portions of bone are separated and loose, they still lodge in the cavities of the ulcers, and, like all other extraneous bodies, occasion irritation of the soft parts, and keep up a discharge of matter. Sometimes, however, nature of herself succeeds in expelling them. This happens in cases, where the size and shape of the ulcer are calculated to facilitate the issue of the dead bone, which does not lie too deeply, and is propelled outward by its own weight. In necroses of trivial size, indeed, it is asserted, that the small fragments of bone may be dissolved in the pus, and come away with it; (*David; Bousselin, Hist. de la Société Royale de Médecine, Tom.* 4, *p.* 308; *Weidmann de Necrosi Ossium, p.* 26;) but, such an event can never be expected when the dead portion of bone is at all extensive.

The last thing which nature does, is to restore the loss of substance which the bone has suffered. Although this operation is so extraordinary and wonderful, that one might be disposed to doubt its reality, numerous examples, recorded in the annals of surgery, prove not only its possibility, but, also, its frequency.

In works referred to at the conclusion of this article, the following authors speak of the regeneration of a part, or the whole of the lower jaw-bone: viz. Bonetus, Bayer, Guernery, Belmain, Acrel, Van Wy, Trioen, Bonn, Reiplein, Desault, Henkel, and Dussaussoir. A student showed Weidmann a lower jaw-bone, which had been thus regenerated, and taken from the body of a man, whom the latter distinguished writer had been well acquainted with. The bone could not be freely depressed; but, yet it performed its functions tolerably well.

Moreau saw a case, in which the clavicle was regenerated, and the new bone was presented by Dangerville, after the patient's decease, to the Academy of Surgery at Paris. (*De Necrosi Ossium Theses, Præs. F. Chopart, resp. P. G. Robert, Parisiis,* 1776.)

Chopart had an opportunity of witnessing the death and reproduction of a scapula.

Weidmann saw an instance, in which nearly the whole cylindrical shaft of the humerus perished, and was afterward regenerated; a phenomenon, that had been observed at earlier periods by Job of Mekren, Cajetano Taconi, E. Blancard, Duhamel, David, Acrel, Bœhmer, Cheselden, and Vigaroux, whose respective works are cited at the end of this article.

Morand, Cheselden, and Bromfield published engravings, respecting a reproduction of the upper part of the humerus, where the old dead bone was included in a sort of bony tube.

Regenerations of the ulna have been observed by Ruysch, Duverney, and Fowles. (See *Thesaur, X. No.* 176. *Traité des Mal. des Os. Paris,* 1751; and *Phil. Trans. No.* 312.)

A similar reproduction of the lower ends of the radius and ulna was witnessed by Acrel. (*Chirurgische Vorfälle von Murray, Vol.* 1, *p.* 194.)

Similar reproductions of the thigh-bone are recorded by Wedel, Battus, Koschius, Hofmann, Scultetus, Diemerbroeck, Wright, Fabricius Hildanus, Raw, Dobyns, M'Kenzie, Ludwig, David, Rousselin, Larrey, Hutchison, &c. in publications specified at the conclusion of this subject.

The following case of necrosis of the thigh-bone is related by Dr. M'Kenzie. William Baxter, a boy thirteen years old, received a blow on his thigh at school, of which he at first hardly complained; but, in a few months, he began to have pain in the thigh, which inflamed, swelled, and appeared to have matter in it. The parents being poor, no surgeon was called, and the boy was allowed to linger for a great while. At length the matter made its way through the skin, by a small opening, on the interior part of the thigh, about three inches above the knee, and a thin sanies continued to be discharged for eighteen or twenty months. At length, the hole in the skin enlarged, and the point of a bone began to protrude, and give a good deal of pain, when the clothes rubbed against it. After suffering in this manner for two years and a half, the boy, as he lay in bed one morning, felt the bone looser, and projecting more than ordinary. He gave it a strong pull, and brought the piece away entirely, which proved to be seven inches and a half of the thigh-bone. A good deal of bleeding followed; but, the wound soon healed, and he has never since found the least inconvenince. Dr. M'Kenzie, hearing of this singular case, sent for the boy, carefully examined his thigh, and found it as firm as the other. The only difference was, that it was somewhat thicker, and a little more curved. The muscles retained their natural softness, and looseness on the bone. The detached piece of bone was a portion of its whole circumference. (See *Med. Obs. and Inquiries, Vol.* 2.)

We may infer, that the occurrence is more frequent in the tibia than any other bone, from the accumulated facts, mentioned by Albucasis, La Marche, Muralto, De La Motte, Ellinchuys, Ruysch, Tacconi, Laing, Johnson, Hunter, David, Boehmer, Sigwart, Th. Bartholine, Hofmann, Saviard, Le Dran, Duverney, Trioen, Gunther, Ludwig, Michael, Bousselin, Weidmann, Russell, Whately, Desault, &c. See the works referred to at the end.

Dr. Hunter mentions a tibia which was sent to him by a Mr. Inett, after amputation. On examination, the case at first sight seemed to be a swelling of the whole bone, with a loose internal exfoliation. However, it proved to be a remarkable instance of the separation of the greatest part of the original bone, whose place was supplied by a callus. The external surface of the enclosed loose piece of bone was smooth. A small part of the surrounding bony substance being removed, the contained piece was taken out, and found to be the whole body of the tibia. It had separated from the epiphysis at each extremity. The middle part of the bone had perished, consequently, had lost its connexion with the periosteum, and was gradually thrown off from the living parts of the bone at each end. A callus extended from end to end, united the two extremities of the original tibia, preserved the length, and gave firmness and inflexibility to the part. The exfoliation was so encompassed by the new bony case, that though quite loose, it could not be thrown out. (*Med. Obs. and Inq. Vol.* 2.)

Weidmann saw a shoemaker, who, after much suffering, extracted himself the greatest part of the diaphysis of the tibia; yet, the loss was so well repaired, that the man could walk afterward nearly as ably as ever. (*De Necrosi Ossium*, *p*. 29.)

"We are not to imagine, (says Weidmann) that these regenerations happen by chance: experiments made upon living animals by Troja, Blumenbach, Koehler, Desault, and myself, prove that they invariably follow certain laws."

In fact, whenever the medullary structure of the long bones of pigeons, or dogs, is destroyed, these bones become affected with necrosis, and are afterward reproduced to the full extent of their destruction.

The observations and experiments, cited by Weidmann, also prove, that it is the long bones which are usually reproduced; though the flat ones are not entirely destitute of the power of regeneration, since experience fully evinces, that, when a portion of the skull is removed, either by a wound, by disease, or by the trepan, nature always endeavours to cover the deficiency, the edges of the aperture extending themselves by means of a bony substance, furnished by the periosteum, the dura mater, and cranium itself. (*Tenon Mém. de l'Acad. des Sciences*, 1758, *p*. 412, 413, 415, 416, 418.) But still the reproduction is imperfect, as a space unfilled up is always left, even when the bone has lost only a small piece, like what is taken out by the trephine; and when the destruction of the cranium is very extensive, no reproduction at all happens. This fact is proved by examples mentioned by Saviard, Pott, Sabatier, &c.

When in a case of necrosis, says Weidmann, a scale or table, of either a long or flat bone, is separated, no regeneration follows, because the granulations, which rise up under the sequestrum, then serve as a periosteum, and as soon as the dead bone is removed, they become united to the adjacent parts.

It is likewise ascertained, that the power of reproduction in the bones is particularly active in the early periods of life, and in healthy subjects; and that it is languid and even annihilated in old persons, pregnant women, (*Bonn's Thesaur. p*. 174,) and in venereal, cancerous, and rickety patients. (*Callisen, Syst. Chir. Hodiernæ, Pars* 1, *p*. 636.)

In order that a new bone may form, the periosteum and other membranes, concerned in the nutrition of the original bone, must have been spared from destruction. In fact, continues Weidmann, we observe that in cases where the tube of a long bone has suffered necrosis, the bone is never reproduced, when the periosteum has been destroyed, by inflammation or other causes. Surgeons ought also to understand that it is not always a reproduction which has happened, when a part of a bone perishes; not even when a tubular portion of a long bone dies, and is contained in the medullary canal. For, says Weidmann, if the innermost layers of a long bone perish, while those which compose, as it were, the bark, are preserved, the latter swell and soften, as if they were actually a new bone. Several round apertures are observable upon their surface, which serve for the transmission of vessels, and are larger than those which perform this office in the natural state. There are likewise formed large openings, or fistulæ, which, as in a new bone, lead to the medullary canal. Here it would be erroneous to conclude that a new bone has been produced, and a very little attention will discover that all is limited to some changes in the external part of the bone, which the necrosis has not affected.

When, therefore, the interior of the canal of a long bone is destroyed by a necrosis, which does not extend to the external layers, the case is not a reproduction of the bone.

When, however, we find the tube of any long bone included in a sort of osseous shell, and the surface of this tube smooth, like that of a bone in the natural state, we may be certain that it has been detached directly from the periosteum, and that the bony shell which contains it, is a new production. On the contrary, if the surface of the dead tube is rough, we may infer that the separation has taken place between the innermost layers of the bone and those which are superficial, the latter composing now the osseous shell, in which the sequestrum is included. (*Weidmann De Necrosi Ossium*, *p*. 31.)

This last theory, concerning the production of the osseus shell in necroses of the long cylindrical bones, is adopted by Richerand as the true one, not only in the instances specified by Weidmann, but in every other example where the old bone seems to be included in another which has the appearance of being a new production, and which was supposed by Troja, David, &c. to be formed by the vessels of the periosteum. (See *Nosographie Chir. T.* 3, *p*. 158, 161, *Edit*. 4.) Boyer does not espouse this theory exclusively; but represents the thing as sometimes happening. (See *Traité des Mal. Chir. T.* 3, *p*. 426.)

As far as the observations of Weidmann informed him, the short or cuboid bones do not appear to be capable of reproduction. (*P*. 31.) Duverney mentions an astragalus, which was destroyed by necrosis, but does not state that any substitute for it was afterward formed. (*Traité des Maladies des Chir. Os, p.* 458.)

Weidmann also never witnessed a reproduction of the spongy substance, such as it was before its destruction, round the medulla. He always found the substituted matter dense and compact, at least for some time after its formation.

It is now admitted, however, that in process of time, the inner surface of the new bone becomes cellular, and is lined with a membrane containing medulla. The regeneration of the medulla was first observed by Koehler, and afterward in an extensive series of experiments, which Professor Thomson made with Dr. Alexander M'Donald, and which were published in the latter gentleman's inaugural dissertation, in 1799. (See *Thomson's Lectures on Inflammation, p.* 393.) Mr. Russel does not appear to adopt this opinion concerning the regeneration of the medulla; for, he states that, after the absorption or removal of the sequestrum, the cavity of the new bone becomes filled up with granulations, which are at length converted into bony matter Thus, he says, the new bone differs from the original one, in being solid instead of hollow. Authorities, however, are decidedly against Mr. Russell on this point: in the 5th vol. of the *Mém de l'Acad. de Chir.* is the history of a man, the whole of whose clavicle came away without his being deprived of any of the motions of the arm. The death of this patient, which happened shortly afterward, afforded an opportunity of examining how nature had repaired the loss. Another clavicle was found regenerated, which neither differed from the original one in length nor solidity; but only in shape, being flatter, and not so round. It was connected with the acromion and sternum, just like the primitive bone.

The power, which thus reproduces bones, is only a modification of that which unites fractures. Indeed, what consolidates broken bones, and is known by the name of *callus*, presents all the characters of new bone, begins and grows in the same way, and may be impeded and retarded in its formation by the same causes. (See *Callus* and *Fractures.*) It is further highly probable, as Weidmann remarks, that the power which effects the reproduction of bones, is the same as that, which, in the sound state, nourishes and supports these parts. But to what organ appertains the function of reproducing bones?

Many able men have ascribed the whole work to the periosteum. (*C. Havers; Duhamel, Mem. de l'Acad. des Sciences*, 1739, 1741, 1742, 1747. *Fougeroux, Mem. sur les Os; Paris*, 1760. *Swencke, Harlemer Abhandlungen* 1, *th. p.* 39. *Bertin, Osteologie. Marigues, Abhandlung von der Fatur und Erzeugung des Callus, p.* 199.)

Haller, (*Elem. Physiol. T.* 8, *p.* 352.) Callisen, (*Collect. Hafn. T.* 2, *p.* 187.) Tenon. (*Mem. de l'Acad. des Sciences*, 1758, *p.* 415.) Bordenave, (*Mem. sur les Os, p.* 227) and many others, have seen a part of the new production spring up from the substance of the old bone; a thing, says Weidmann, which one is also led to believe by the fact, that, when the whole tube of a long bone is affected with necrosis, the epiphyses which remain sound and untouched, unite and grow to the new tube, though no periosteum exists in the situation of the union.

Nor does Weidmann think that the specimen of a fractured thigh, of which Blumenbach has published an engraving, proves the contrary. (*Geschichte und Berschreibung der Knocher; Gottingen*, 1786, *Tab.* 1, *fig.* 1.) This preparation exhibits an union which had taken place by means of a very broad osseous ring, encompassing the ends of the fracture which lie far asunder. The event appears to Weidmann to have been the result of rachitis, or lues venerea, with which the young patient, according to Blumenbach himself, had been affected, and by which the nutrition of this bone had been disordered. For, says Weidmann, in other examples of united fractures, the ends of the bone are so connected together by the callus, that there does not exist a single point between them, where this substance is not effused, and the medullary canal itself is obstructed and filled with it. In the *Journ. Complem. du Dict. des Sciences Med. T.* 8, may be found some considerations, offered by Larrey, against the doctrime that the periosteum is the organ of ossification.

That, however, the periosteum is frequently the organ of the reproduction of the bones, seems proved by the experiments of Troja, Blumenbach, Desault, and Koehler, since in these the bones were invariably regenerated, though there was nothing left of the old bone that could furnish the new reproduction, except the periosteum.

If we examine the new bone, at different periods of its developement, it appears in the earliest state in the form of a redish fluid, as has been observed by Duhamel. Fougeroux, Bordenave, Haller, Callisen, and others. If we also attend to the progressive changes which this fluid undergoes, we cannot but believe that, as in the embryo, an organic and fixed arrangement of parts takes place. Indeed, it would be erroneous to consider such fluid as destitute of organization and extravasated at random. Thin and little in quantity on its first appearance, its consistence and quantity afterward gradually increase (*Troja, p.* 42, 44,) so that what at first appeared like a liquid, soon becomes a gelatinous substance, in which are developed, especially at its inner surface and towards its lower part, bony fibres, which incessantly become more and more numerous. These fibres in a short time form little layers and cells, and extend themselves every where, so that at length all which was fluid disappears, and the new bone is produced. While young, however, it is still spongy and reddish, (*Troja, p.* 44;) but soon becomes denser, harder, and more solid, than that was for which it is a substitute, and it acquires the ordinary colour of the rest of the bones.

The external surface of the new bone, which, during the period of its formation, was irregular, and studded with several excrescences of various sizes, and pierced with apertures of different dimensions, becomes in the course of time smooth and regular, especially after the expulsion of the sequestrum.

The sides, or walls of the new bone, which at first were of considerable thickness, in time also grow thinner. (*Troja, p.* 21.) When the entire dead bony cylinder continues in its cavity, the new bone is neither shorter, nor longer, than the original. But, should one of the ends of the dead tube protrude from the cavity, while by the side of the affected bone, there is not another one capable of resisting the action of the muscles, the new bone will be shortened, and undergo some change in its shape and direction. Indeed, says Weidmann, the new bone in its early state, from want of consistence, must yield to the efforts of the muscles.

Its shape is not exactly like that of the original bone: the sides are flatter; the usual angles, depressions, and eminences are not observable, and sometimes others are formed.

How admirable is the process, by which the muscles, detached from a bone affected with necrosis, have other insertions given to them, and are thus rendered capable of performing their functions! (*Troja, p.* 27.)

The periosteum, which swells as soon as the exfoliation of the old bone commences, shrinks, and is not at all thickened, when the exfoliation is finished. Troja, having destroyed the medullary structure of a long bone, found the periosteum swelled at the end of 36 hours; but he observed, that the whole of such swelling disappeared before the 25th day. (*P.* 43, 67.)

The periosteum, which thus survives, adheres to the new bone, as it did to the old one: its vessels, which are now increased in diameter, and convey a larger quantity of blood, dive into large apertures in the regenerated bone, ramify every where in its substance, and nourish it.

Dr. Macartney's observations nearly agree with those of Troja and Weidmann, respecting the formation of the new bone by the periosteum, with this difference, however, that he does not describe the original periosteum as becoming afterward attached to the new bone, but as disappearing. Dr. Macartney remarks, "that the first and most important circumstance is the change, which takes place in the organization of the periosteum; this membrane acquires the highest degree of vascularity, becomes considerably thickened, soft, spongy, and loosely adherent to the bone. The cellular substance, also, which is immediately connected with the periosteum, suffers a similar alteration: it puts on the appearance of being inflamed, its vessels enlarge, lymph is shed into its interstices, and it becomes consolidated with the periosteum. These changes are preparatory to the absorption of the old bone, and the secretion of the new osseous matter, and even previous to the death of the bone, which is to be removed. In one instance, I found the periosteum vascular and pulpy, when the only affection was a small abscess of the medulla, the bone still retaining its connexion with the neighbouring parts, as it readily received injection. The newly organized periosteum, &c. separates entirely from the bone, after which it begins to remove the latter by absorption;" and, while this is going on, its inner surface becomes covered with little eminences, resembling granulations. "In proportion as the old bone is removed, new osseous matter is dispersed in the substance of the granulations, whilst they continue to grow upon the old bone, until the whole, or a part of it, is completely absorbed, according to the circumstances of the case. What remains of the investment, after the absorption of the old bone, and the formation of the osseous tube, which is to replace it, degenerates, loses its vascularity, and appears like a lacerated membrane. I have never had an opportunity of examining a limb, a sufficient time after the termination of the disease, to ascertain, whether the investment be at last totally absorbed, but in some instances, I have seen very little remaining. During the progress of the disease, the thickened cellular substance, which surrounded the original periosteum, becomes gradually thinner; its vessels diminish, and it adheres strictly to the new-formed bone, to which it ultimately serves as a periosteum." Dr. Macartney states, that the anatomical preparations, which authenticate the above observations, are preserved at St. Bartholomew's Hospital. (See *Crowther on White Swelling, p.* 183. *Ed.* 2.)

Mr. Stanley, however, lately showed me in the same museum, a preparation, which tends to confirm the accuracy of Troja's account of the old periosteum becoming adherent to the new bone. In this example, the periosteum is perfectly continuous with that covering the epiphyses. If this were not the fact, we should have to explain in what way the periosteum of the new bone is formed. We know that the vessels of the original periosteum enter the new bone, in order to complete its formation, and it seems more consonant with the uniform simplicity of nature's operations, to suppose that this connexion is kept up, than that the old periosteum should be totally removed, after the production of the new bone, and another membrane of the same kind be then generated.

An interesting example of necrosis of the thigh-bone, published some time ago by Mr. C. Hutchison, tends also to prove, that the new osseous shell is commonly formed by the periosteum, as, in this case, the medullary bags, or cells, were found completely ossified, (*Practical Obs. in Surgery, p.* 135) and could not therefore be supposed to be capable of the work. Among the moderns, also, Dr. M'Donald deserves to be mentioned as one of the most distinguished advocates for the truth of Troja's explanation of this subject. (See *M‘Donald's Thesis de Necrosi ac Callo; Edinb.* 1799.) Another late writer has adduced many arguments to prove that the pulpy mass, which extends from one epiphysis to the other, and is itself at last converted into bone, is formed quite independently of the original bone, or the periosteum. (See *Russell's Practical Essay on Necrosis, p.* 27, *Edinb.* 1795.) This account, however, is contrary to the observations of Troja, David, Weidmann, M‘Donald, Macartney, and numerous other observers. Indeed, a modern author seems to think the periosteum so essential to ossification, or the production of a new bone, that he attempts to explain the cause of fractures of the patella not becoming united by a bony substance, by adverting to the deficiency of periosteum upon it; a circumstance which he deems also a strong argument against Mr. Russell's doctrine. (See *Hutchison's Practical Observ. in Surgery, p.* 141, 142.)

These very same cases, however, fractures of the patella, do sometimes unite by bone, and, therefore, while Mr. Hutchison is urging them as facts against Mr. Russell's opinion, Baron Larrey is actually adducing them in its support. (See *Journ. Complém. du Dict. des Sciences. Méd. T.* 8.) The experiments of Breschet and Villermé are decidedly against the periosteum being exclusively the organ of ossification.

Professor Boyer does not refer all the work of reproducing bones exclusively to the periosteum in every instance; but joins Weidmann in believing, that what seems a new bone is sometimes only a separation and thickening of the external layers of the original bone, which have escaped destruction. He notices the modifications, to which the phenomena of necrosis are subject when the disorder affects the whole thickness, and the whole, or the greater part, of the circumference of a long cylindrical bone. When the periosteum is destroyed together with the bone, and the medullary membrane, which does the office of an internal periosteum, is preserved, Boyer represents the latter membrane as undergoing similar changes to those which we have mentioned as taking place, under other circumstances, in the external periosteum, and he describes it as becoming the organ by which the new bone is formed. (See *Traité des Maladies Chir. T.* 3, *p.* 432.) But when the whole thickness and circumference of a long bone are destroyed, together with the medullary membrane, while the periosteum survives, Boyer agrees with Troja, &c. in believing the latter membrane to be the means by which the new bone is generated.

The internal surface of the new bone is lined by a new membrane, which serves as a periosteum, and is at first hardly distinguishable. (*Troja, p.* 56.) In the early state, it is soft and pulpy; (*ibid. p.* 22;) but, by degrees, it grows thicker and firmer, and is at length converted into a true membrane, which sends a great number of vessels into the substance of the bone. When this membrane is torn off, the surface, which it covered, is found somewhat smooth, the edges of the bony layers, and projections of the fibres being blunt and rounded.

The cavity of the new bone includes, and almost entirely conceals the dead fragments. Sometimes, however, the new bone forms a sort of bridge over the sequestrum, in such a manner that the cavity is open above and below, in both which situations the sequestrum can be felt. (*Hunter, in Med. Obs. and Inquiries Vol.* 2, *p* 418.)

Sometimes, it is only a narrow cross-piece, which forms the bridge retaining the sequestrum. (*Weidmann, vid. Tab.* 5, *Fig.* 1, *a.*)

The new bone may also have an opening in it, out of which the dead portion protrudes. (*Ib. p.* 35.)

Sometimes the cavity of the new bone is single; while in other instances, there are several successive cavities in the direction of the length of the bone, with transverse interspaces between them; or else the cavities are situated laterally with respect to each other, and divided by partitions. (*Weidmann, Tab.* 7, *Fig* 2.)

These cavities are proportioned in size and shape to the fragments of dead bone, which lodge in them. It occasionally happens, that they open into some neighbouring joint, and bring on suppuration there: a very unfavourable complication. (*Ibid. p.* 34, *and Tab.* 6, *Fig.* 3; *also, Boyer, Traité des Mal. Chir. Tom* 3, *p.* 435.)

Let us next follow Weidmann, and take notice of the holes, by which the cavities, including the dead pieces of bone, open externally, which Troja denominated the large foramina, and which the preceding excellent writer preferred calling the *cloacæ*, because they serve to convey outward the matter and any separated pieces of bone. In the beginning of the disorder, they are not observable, a certain space of time appearing to be requisite for their formation. They are noticed in long cylindrical bones, whether original, or of new production, whose cavities contain dead fragments.

These openings vary in number: when the sequestrum is small, only one is found; but, when the piece of dead bone is extensive, there may be two, three, or four. Weidmann never saw more than five. But Troja met with eight. (*P.* 58.) Weidmann possessed a small portion of the diploe of the os innominatum, which was affected with necrosis, and contained in a bony cavity, that had no external opening whatever.

When there are several distinct cavities in the same bone, containing dead fragments, each cavity has at least one external opening.

These *cloacæ*, or apertures, are commonly situated at the lower and lateral parts of the cavities; pass obliquely outwards; and communicate with fistulous ulcers, which open on the surface of the skin. (*David, p.* 186.) Some of the cloacæ, however, form at the middle, or (what is exceedingly rare) at the upper part of the cavities, and proceeding outward, without any oblique track, go to the front, back, or lateral parts of the limb.

They are of a round, or oval shape, or nearly so. Their usual size is such, that it will just admit a quill, and they vary very little from this dimension.

They terminate internally by converging approaching edges, in the manner of a funnel; while, on the contrary, the margins of their outer extremity expand. The canal between these two orifices is sometimes long, sometimes short, and in certain cases, of no extent at all.

Different opinions have been broached, respecting the causes which produce the apertures in the new bone, termed by Weidmann the *cloacæ*.

M. David says, that the pus collecting in an early stage of the disease between the bone and periosteum, distends and corrodes this membrane, and that the openings which form in it become afterward a cause of fistulæ in the new bone. (*P.* 186.) But it is observed by Weidmann, that this explanation is inadmissible, since the existence of the collection of pus, mentioned by M. David, is not proved by observation: in fact, it was never met with by Troja, Blumenbach, Desault, Koehler, and many others, in repeated experiments made on the subject. (*Troja, p.* 56 *and* 66; *Weidmann, p.* 36.)

Kœhler thought he had seen the new bone itself destroyed by the pus, and *cloacæ* thus produced. (*P.* 68—72.)

Weidman, however, deems this opinion quite as improbable as the preceding, for the fact of the surface of these bony apertures being always smooth, always formed in one manner, and constantly lined by the periosteum, decidedly proves that they cannot arise from erosion.

Troja, in his third experiment upon the regeneration of bones, remarked, that forty-two hours after the destruction of the medulla, there took place, between the bone and the periosteum, an effusion of lymph, which was at first thin and little in quantity, but afterward became thicker. He noticed, in the midst of this gelatinous substance, *some small spaces, where it was deficient, and which had, instead of it, a subtile, whitish, dry incrustation, which, though tolerably adherent, could be rubbed off. These small spaces, according to Troja, produce the apertures called the cloacæ.* (*Troja, p.* 45.)

In another experiment, he had an opportunity of examining the above little spaces at the end of forty-eight hours; he affirms, that they were replaced by the large apertures, or cloacæ, of the new bone (*P.* 47;) and that such openings were invariably formed in the place of the small incrusted spaces already described. (*P.* 58.) As Troja took notice that no lymph was effused at these particular points, he was inclined to impute the circumstance to a defect in the ossification, and, *perhaps, to the death of some parts of the periosteum.* Weidmann acknowledges, that the mode, in which the formation of the cloacæ happens, is exceedingly obscure; and expresses his belief, that Troja's account of it approaches the nearest to the truth. But, says he, one thing is certain, namely, that these openings have no other use, but that of conveying outward the pus, which collects in the cavity, and the small bony fragments, since, as soon as every atom of dead bone has passed out, they diminish, and, at length, are totally obliterated. (*Weidmann De Necrosi Ossium, p.* 36.)

It is a remarkable circumstance, in the history of necrosis, that, in favourable instances of the disease, the inflexibility and firmness of the limb are preserved during the whole of the process, by which the new bone is formed. Consequently, the new bone must have begun to grow, and have acquired firmness before the old bone separates, or is absorbed. Were this not the case the limb must become flexible and useless, the moment the dead bone is removed. Another consequence of the new bone being formed, before the removal of the old one, is that the former must surround and include the latter. For, since the lifeless portion of bone completely occupies the space between the two living ends, these cannot be immediately connected by the new bony matter. The connexion can alone be completed by the new bone being deposited on the outside of the old one, from one end to the other, and attaching itself to the portions which still remain alive. The new bone must also be necessarily larger than the old one, because externally situated, and hence the affected limb, after the cure is complete, will always continue larger, clumsier, and less shapely than the other. The length of it, however, remains unaltered, because the old bone retains its attachment, while the rudiments of the new bone are lying on its outside, and connect the living ends of the old one, by an inflexible mass, equal in length to the portion which is destroyed.

Thus we see, that, in the process which nature follows in the formation of the new osseous shell, the old bone serves as a mould for the new one, and the first step of the process is to surround the old bone with an effusion of coagulating lymph. (See *Russell on Necrosis, p.* 2—7.)

When the sequestrum is thrown off slowly, the inflammation is moderate; but when it separates quickly, while the new bone is in a soft state, the detachment is always preceded by severe inflammatory symptoms, and followed by a temporary loss of the natural firmness of the limb. This premature separation of the sequestrum often occurs in necrosis of the lower jaw, and the chin consequently falls down on the neck. In certain cases, the sequestrum separates at each end from the living portions of the old bone, before the new osseous shell has acquired firmness, so that the limb feels as if it were broken in two places. (*Russell.*)

Let us next consider the states and circumstances of necrosis, in which the art of surgery may be advantageously exerted in the assistance of nature, and the means which may be employed for this purpose.

A common error of medical and surgical practitioners is always to impute the cure of every disease to whatever remedies happen to be employed, and successes are too often boasted of, the merit of which belongs entirely to nature. It is, indeed, not very unfrequent to hear remedies panegyrically spoken of, which counteract the salutary efforts of nature, who, in this case, is obliged to overcome both the disease, and the irrational treatment, which is applied to it. As Weidmann observes, this erroneous mode of considering things has happened particularly often among surgeons who have had cases of necrosis under their care, all of whom boast of the cures which they have accomplished, although some employed absorbent earths, others, aromatics; some, spirituous applications; others, balmy remedies; some, acids; others, caustics; and some, armed with a wimble, made numerous perforations in the dead bone; while many others rasped the part, or attacked it with the trepan, cutting forceps, the gouge and mallet, or even the actual cautery; and a certain number did nothing more, than apply dry lint. Nature, who was favourable to all, did her own work in silence, whatever were the remedies employed for her assistance, whether mild and inert; acrid and corrosive; or hurtful and improper.

We have already noticed, that a dead portion of bone separates from the living exactly in the same way, as gangrenous soft parts spontaneously drop off, without the interference of art. The separation happens precisely at the points to which death has extended; limits, which are well understood only by nature, and of course can be measured only by her. Art would incur great risk of either going beyond them, or else of not reaching them at all. Perhaps, it may be deemed unsafe to confide the process of separation, or exfoliation, to nature. But, in what other manner could it be more safely accomplished, without hemorrhage, or pain to the patient—without any risk of a recurrence of inflammation, or of a fresh necrosis?

Is there reason to fear, that, when every thing is left to nature, the separation cannot be finished till after a very long period of time? It is true, say Weidmann, that the process frequently requires a considerable time; but, as the vitality of the bones is not possessed of much energy, and their component parts strongly cohere, slowness is inevitable in an operation, which depends entirely upon the vital power. What is it then which surgery can do to accelerate the process?

Will any of the above-mentioned topical applications have this effect? They are put upon the inert surface of a dead piece of bone, in which no vital power, or action, can be again excited. When acrid, they prove irritating, inflaming, and destructive of the neighbouring flesh, without any utility—and cause pain to the patient, which is compensated by no good. Would the perforations, recommended by Celsus, Belloste, and many others, have the desired effect? If, says Weidmann, they are confined to the dead bone, they cannot have more effect, than the scarifications, which were formerly practised by ignorant surgeons in cases of gangrene; and, if they extend to the living bone, this will be injured or at least run the risk of being so. Lastly; Weidmann demands, if the separation can be accelerated by the actual cautery, which cannot act upon every point of the necrosis, and which, unless applied with the greatest precautions, will burn the subjacent parts, and bring on a new attack of inflammation, without forwarding the exfoliation in the smallest degree?

Of what use can rasping and scraping instruments be, which act merely upon the dead part? Or will the gouge, and other cutting instruments, do more good? They cannot take away the whole of the dead portion, without injuring the adjacent living bone, and causing a risk of another necrosis. And, if they leave any pieces of the old dead bone behind, nature will be as long in effecting the separation of these, as she would have been in detaching the entire necrosis.

Weidmann mentions a case, which occurred in the hospital of St. Roch at Mentz. A man's legs were seized with mortification, in consequence of exposure to cold; the whole of the dead parts separated; and the bones were sawn through on a level with the living flesh. A portion of the end of each bone, however, was afterward thrown off altogether by nature, and Weidmann thence concludes, that the previous use of the saw had been fruitless. Weidmann then cites another case of mortification of the leg and half of the thigh, which was the consequence of a putrid fever. The leg sloughed away, leaving the lower portion of the thigh-bone uncovered and projecting. Under a tonic plan of treatment, this part of the bone spontaneously separated. As, however, a considerable quantity of integuments had been destroyed, the ulcer was slow in healing; but, it cicatrized at last, and the young woman continued well long afterward.

Weidmann has quoted the memorable case, in which Mr. Charles White first sawed off the upper part of a diseased humerus. (See *Amputation.*) As, in this instance, nature accomplished of herself the separation of another dead portion of the same bone, two months after the operation, Weidmann seems disposed to think the cure would have happened equally well without it.

In cases of slight superficial necrosis, surgeons have frequent opportunities of trying every kind of topical application; and when the cure takes place, during the use of any of them, the benefit is ascribed to whatever happens to be in use. But, says Weidmann, in numerous more serious examples of necrosis, it is impossible to make these applications reach the whole surface of the dead bone; but, notwithstanding this circumstance, the separation is not impeded. Some exfoliations happen, without our knowing of their occurrence, and without a thought having been entertained of promoting them by any vaunted applications. We even see necrosis separate, whose situation rendered them inaccessible to our remedies; such are the necrosis, which occur within the long bones, and comprehend the whole of their cylindrical shaft or body. What surgeon shall presume to boast of his having effected by topical applications, the separation of the whole lower jaw-bone; a thing, which nature has very frequently accomplished? And, when, as often happens, the entire diaphysis of the thigh-bone, tibia, or other long bone, comes away; or, split longitudinally, such bone loses a half of its cylinder; how is it possible for any topical applications to reach every point, at which the separation occurs?

The internal remedies, such as assafœtida, madder, sarsaparilla, hemlock, belladonna, onopordum, lime-water, &c. recommended by numerous practitioners, have in reality no direct efficacy in promoting the separation of necrosis: if, says Weidmann, they do any good, it can only be by their tonic and alterative qualities, or rather by keeping the patient amused, so as to gain the requisite time for the completion of the process of exfoliation. The employment of all these ineffectual means, Weidmann conceives, must have originated from ignorance of the process, followed by nature in separating dead portions of bone, and from ascribing to the arterial pulsations or the power of the granulations, what certainly depends upon the action of the absorbent vessels.

A question here naturally presents itself.—Would there be any utility in exciting by stimulants the action of the lymphatic vessels, in order to accelerate the separation, of which it is the efficient cause?

Weidmann thinks, that very beneficial effects might result from the plan. But, he asks, what means should be used for this object? Cold? Purgative medicines? Repeated vomits? Squills? Camphor? Neutral Salts? Issues? (*Vid. Wrisberg, Comment, Soc. Reg. Gott. Vol. 9, p.* 136, 1789.) He adds, that, perhaps, many valuable discoveries will hereafter be made on this subject.

The reasons already detailed, and a variety of experiments successfully made by Weidmann, lead him to set it down as an established principle, that the separation of a necrosis is almost entirely the work of nature, and that surgery can do very little in the business.

Ignorance of this important fact paved the way to the wrong practice of making incisions, for the purpose of exposing the whole surface of a necrosis, immediately the existence of the disorder was known. As such incisions very soon closed up again, so as to leave only a small outlet for the matter, they were in many cases repeatedly practised before the dead bone became loose.

The avowed design of the incisions was to make room for the topical remedies, which were to render the exfoliation quicker; but, as these remedies possess no real efficacy, it follows, that making incisions, before the dead bone is loose, only torments the patient, without producing the least benefit.

The orifices of the ulcers, then, which allow the discharge to escape freely, are, says Weidmann, sufficient as long as the fragments of bone are not entirely detached, and the surgeon should all this period abstain from the use of the knife.

Although Weidmann condemns every mode of treatment, which is inefficacious, painful, and sometimes even hurtful, he would not have it supposed that he altogether rejects all assistance from medicine. On the contrary, he approves of all those means, which are consistent with the views of nature, which really assist her, and do not tease the patient to no purpose. In short, says he, *the indications are limited to removing the original cause of the disease; to alleviating the symptoms; to supporting the patient's strength, and improving the state of the constitution, in whatever respect it may be bad; and, lastly, removing the dead portions of bone, when they become loose.*

Above all things (continues this sensible practitioner) the surgeon must not regard every piece of exposed bone, as necessarily affected with necrosis, and, in consequence of such idea, have recourse to acrid, drying caustic applications. Such means are not only useless, but absolutely pernicious; because they may actually cause a necrosis, which did not exist, before they were used, and which would not have taken place at all, if only mild simple dressings had been employed.

When the disease presents itself with violent symptoms, the inflammation and fever being intense, the severity of the case is to be assuaged by low diet, antiphlogistic remedies, emollient applications, and venesection in moderation, the disease being one which is of long duration, and apt to wear out the patient's strength. Here, perhaps, topical bleeding ought always to be preferred to venesection. When the necrosis has arisen from syphilis, scrophula, or scurvy, &c. the medicines, calculated for the cure of these affections, must be exhibited, ere any favourable changes can be expected in the state of the diseased bone.

Lastly, it is the duty of the practitioner to extract the fragments of dead bone, in order that the deficiencies produced by them may be filled up, and the ulcers of the soft parts heal.

Nature, who succeeds by herself in detaching the dead pieces of bone, can do very little in promoting their passage outward. Frequently, indeed, she has no power at all in this process, and it is only from surgery that assistance can be derived. When a dead piece of bone is still adherent at some points, its extraction should be postponed, until it has become completely loose. If it were forcibly pulled away, there would be danger of leaving a part of it behind, which must have time to separate, ere the cure can be accomplished.

But, when a fragment is entirely detached, and the orifices of the sores are sufficiently large, it is to be taken hold of with a pair of forceps, and extracted.

When the ulcer has only a very narrow opening, suitable incisions must be practised, in order to facilitate the removal of the loose dead bone.

Sometimes, the dead fragment protrudes from the ulcer, and projects externally, so that, if loose, it admits of being taken hold of with the fingers, and removed. In this way, Weidmann took away a large dead piece of the humerus, which protruded nearly two inches out of an ulcer in the middle of the arm. The patient was a young lad, 14 years of age; and the limb concave within, convex externally, thicker, and one inch shorter than its fellow. He got quite well three weeks after the removal of the dead bone.

We have already adverted to the example, recorded by Weidmann, in which a shoemaker removed by himself nearly the whole body of the tibia. Doubtless, the projection of the bone, and its looseness, enabled the man to do this easily with his fingers. But, there are cases, which present more difficulty; such are those, in which the sequestrum is, included in a cavity, either of the original, or new bone.

The old surgeons were in the habit of amputating limbs which were in this state; although instances were not wanting in their days to prove the possibility of relieving the disease, without amputation. This blamable custom of removing every limb, thus affected, is justly exploded from modern surgery. Albucasis was the first who attempted to cure such a case of necrosis, by the judicious employment of the knife and saw. (*Lib.* 2, *cap.* 88.) The same kind of practice was successfully adopted in two instances by the celebrated Scultetus. (See *Armament Chirurg. Tab.* 46, *and Obs.* 81.) This commendable method, however, afterward fell into disuse, until M. David, by twenty examples of success, refuted all the objections which had been urged against it. (*P.* 197.) Since the period of this distinguished author, the practice has been imitated by all enlightened surgeons, so that the case is no longer regarded as a disease necessarily requiring amputation. M. Bousselin has cut out the sequestrum eight times from the tibia, and four times from the thigh-bone, with perfect success. (*Vid Mém. de la Société Royale de Médecine, Tom.* 4.)

The method consists in exposing the bone, and making in it an opening of sufficient size for the removal of the loose dead fragments.

Experience has proved, not only that, patients affected with necroses, easily bear this operation, but also that after its performance, the ulcers commonly heal very favourably, the health becomes re-established, and the functions of the part affected are hardly at all impaired.

Surgeons, however, are not indiscriminately to choose any period for doing the operation. If they are too hasty, they will run a risk of finding the dead portion of bone still adherent to the adjacent parts; and, if they delay too long, the patient may be irrecoverably reduced, while the new bone, on account of the hardness which it has now acquired, cannot be so easily perforated.

Patients are met with, who have been afflicted with necrosis several years. In such cases, great circumspection is necessary, and the practitioner should carefully endeavour to ascertain, that the dead pieces of bone have not been absorbed, or come away piecemeal in the discharge, lest an useless operation should be done, as once happened in the practice of M. Bousselin. (*Mém. de la Société Royale de Médecine, T.* 4, *p.* 304.) Therefore, when the disease is of long continuance; when the discharge is much less than it was at the commencement; when small pieces of bone have at times been voided; and the sequestrum cannot be felt with a probe; it is doubtless, says Weidmann, most prudent to abandon all idea of operating, and allow nature to finish what she has so well begun. In short, when the sequestra are undergoing a gradual absorption, without ever making their appearance externally, or giving any considerable disturbance to the constitution, or, when the dead bone is making its way outward, without occasioning urgent inconveniences; the surgeon should interfere very little with the natural progress of the case. When the dead bone does not tend to make its way through the skin, but lies quietly concealed in the new osseous shell, the occurrence of extensive suppurations may be prevented, by occasionally applying leeches, and keeping open a blister with the savine cerate, as recommended by Mr. Abernethy in his lectures, and Mr. Crowther, in his work on the White-Swelling. The blister will, at the same time, have great effect in promoting the absorption of the sequestrum, and, of course, in accellerating the process of cure.

If the surgeon operate as soon as the sequestrum becomes loose, he will find the new bone so soft, that it can be divided with a knife; a circumstance, which materially facilitates and shortens the operation.

Keeping in mind the foregoing precepts, the surgeon is to begin with exposing the bone in which the sequestrum is contained. When the bone lies immediately under the skin, Weidmann recommends making such incisions as will lay bare the whole of its surface, and when its situation is deeper beneath the muscles, he even sanctions cutting away as much of the flesh as may be necessary to allow the instruments to be freely worked upon the bone. I cannot, however, see the propriety of this advice; exposing the whole surface of the bone in the first instance, before it is known whether the saw need be so extensively used as to require such a denudation, certainly appears irrational. And, as for cutting away any portions of muscle, this can be no more necessary here, than it is in the operation of trephining. But it is unquestionably proper to make with the bistoury sufficient space for the use of whatever instrument is employed for the division of the bone. Yet it is only necessary to make this exposure in the first instance in one place. The surgeon can afterward enlarge the incision or practise others, as circumstances may indicate. The surface of the bone being brought into view, if the cavities, in which the dead fragments lodge, present apertures which are too narrow, these apertures must be rendered larger by means of small trephines, or saws constructed on the principles of those described by Mr. Hey of Leeds. The perpendicularly acting wheel-like saw, turned by machinery, and invented by Mr. Machell, here promises also to be of important assistance. It has been used by Sir Astley Cooper, who has given an engraving of it in his Surgical Essays, Part I. Pl. 8. Fig. 7. And another saw, constructed on somewhat similar principles, has been employed by Graefe of Berlin with great advantage for several years. A tract, giving an account of it, was sent to me by the late Dr. Albers, a little before his death; but, as I have now lent the publication to Mr. Stanley for the purpose of assisting Mr. Evans in the construction of the instrument, I shall merely add, that Graefe's saw is turned by a handle which projects horizontally from the cutting part of the instrument, and that it has a frame or fulcrum, on which it works. With such instruments the pieces of bone extending across the above openings, and impeding the extraction of the sequestra, may also be removed.

But when the preceding cavities are closed on every side, and it is impossible to reach into them in any other way, than through the cloacæ, a trephine is to be applied, which must comprise within its circle a half of the fistulous opening. The crown of the trephine, however, must not be broader than the cavity of the bone, nor yet narrower than the sequestrum.

If, after making a perforation in this manner, the sequestrum should be found too large to pass through the opening, a small saw must be employed for enlarging the aperture.

When the bone is so hard and thick that it cannot be well cut with a saw, the surgeon has the sanction of authority and experience, for using a gouge and mallet.

When the sequestrum is found to be very large, it will be necessary to expose more of the surface of the bone by incisions. In this sort of case, Weidmann recommends applying the trephine to the upper and lower parts of the cavity, and then cutting away the intervening portion of bone with the saw or gouge. But there can be no doubt that a more prudent way would be to go on with the enlargement of the aperture in the bone, at the place where the first perforation took place, if the sequestrum presented itself equally well there, because, by proceeding in this manner, the surgeon might discover that the dead fragment could be taken out without so great a destruction of bone as is caused in the other mode; and, if this were not to be the case, no harm is done, as the necessary removal of bone can be continued.

When the bone, which includes the sequestrum, is a new production, and the operation is not too long deferred, the soft state of the bone will enable the operator to perform the needful excisions with the bistoury alone.

When the sides of the cavity, in the original bone, are thin, fragile, and pierced with numerous holes, the surgeon can break away a sufficient portion with a pair of forceps.

When several sinuses exist in the bone, each may be dilated, in the manner which seems most advantageous.

Sufficient openings having been made into the cavities including the sequestra, the next object is to extract these dead portions of bone. In accomplishing this part of the operation, Weidmann particularly advises two things; first, that no piece of the sequestrum be left behind; secondly, that no injury be done to the membrane, which lines the cavity in which the dead bone is lodged.

This author observes, that there are examples, in which the vicinity of certain parts impedes the surgeon from making an opening in the bone, large enough for the extraction of a voluminous sequestrum in an entire state. In this circumstance, he recommends the sequestrum to be broken into pieces by any convenient means, and the fragments to be separately removed.

Weidmann has recorded an extremely interesting case to prove how much may sometimes be effected by taking away the sequestrum. A man, 34 years of age, who had an internal necrosis of the tibia, with abscesses and œdema of the whole limb, and who was reduced to the lowest ebb of weakness, was put under this excellent surgeon's care. A perforation was made with a trephine in the upper head of the tibia; but, this opening not proving ample enough, it was enlarged with a small saw, and a gouge and mallet. The sequestrum was then extracted. The patient's state afterward gradually improved, and in nine months he was completely well.

It is not to be dissembled, however, that cases do exist, in which amputation affords the only chance of saving the patient's life. In fact, it sometimes happens, that the cavities, in which the sequestra are contained, communicate with those of the neighbouring joints, which then become filled with matter, and caries attacks part of the bones, to which the necrosis does not extend. On some occasions, the dead pieces of bone are very numerous, and each has a separate cavity; while, in other instances, the sequestra lie so deeply, that a passage for their extraction cannot be prudently attempted. Sometimes, also, a necrosis is complicated with another disease in its vicinity. Lastly, such may be the reduced state of the patient's health, and the particular condition of the necrosis itself, that the constitution cannot hold out during the whole time which would be requisite for the detachment of the sequestrum. Under circumstances like these, amputation is necessary, and ought not to be delayed.

For the authorities of many of the observations and cases in the foregoing article, and for additional information on the subject, see *Albucasis, lib. 2, cap. 88. Scultetus, Armament. Chir. Tab. 46, and Obs. 81. Belloste, Le Chirúrgien d'Hôpital, part 1, chap 12. J. Louis Petit, Traité des Maladies des Os, Tom. 2, chap. 16. Monro's Works by his Son. Tenon in Mém. de l'Acad. des Sciences,* 1758. *Aitken, Systematic Elements of the Theory and Practice of Surgery, Edinb.* 1779, *p.* 288. *Some interesting cases and remarks, chiefly about the question of amputation, are contained in Schmucker's Vermischte Chir. Schriften. B.* 1, *p.* 17, *&c. Ed.* 2. *Callisen, Systema Chirurgiæ Hodiernæ, Vol.* 2, *p.* 893. *Gott* 1800. *C. White, Cases in Surgery, London,* 1770, *p* 57, *&c. Wrisberg, Comment. Soc. Reg. Gott. Vol. 9, p. 136, &c. Bousselin, in Mém de la Société Royale de Médecine, Tom. 4. Louis, in Mém. de l'Acad. de Chirurgie, Tom. 5. 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Francofurti ad Moenum,* 1793; *et de Necrosi Ossium adnotatio; Frank. Del.* 4. *This publication is, perhaps, the best general account of the whole subject of necrosis. It is not only enriched with the observations of numerous other writers on the disease, but contains the most approved theories and opinions respecting many other affections of the bones, Caries, Exfoliations, &c. It was a great assistance to me in the composition of the foregoing article. Consult also Richerand Nosogr. Chir. T.* 3, *p.* 153, *&c. Ed.* 4, *Paris,* 1815. *Dr. Alex. M^{c}Donald's Thesis de Necrosi ac Callo, Edinb.* 1799. *Hutchison's Pract. Obs. in Surgery, p.* 180, *&c. London,* 1816. *James Russell's Practical Essay on a certain Disease of the Bones, termed Necrosis,* 1794. *Whately's Pract. Obs. on Necrosis of the Tibia,* 1815. *Macartney, in Crowther's Obs. on White-Swelling, &c. Edit.* 2. *Encyclopédie Méthodique, Partie Chir. art. Necrose. Leveillé Nouvelle Doctrine Chir. T.* 4, *p.* 321, *&c. Paris,* 1812. *Larrey's Mém. de Chirurgie Militaire, T.* 3, *p.* 367, *&c. Thomson's Lectures on Inflammation, p.* 39. *&c. Edinb.* 1813. *Boyer's Traité des Maladies Chirurgicales, T.* 3 *p.* 418, *&c. Paris,* 1814. *Delpech, Précis Elémentaire des Mal. Chir. T.* 1, *Chap.* 3; *Paris,* 1816. Some account of an operation in which M. Dupuytren, of Paris, removed the mental portion of the lower jaw, may be found in the *London Medical Repository, Vol.* 3, *p.* 432. The wound healed by the first intention, and the patient recovered.

NEEDLE. See Appendix.

NEPHROTOMY. (from νεφρος, a kidney; and τεμνω, to cut.) The operation of cutting a stone out of the kidney; a proceeding which, perhaps, has never been actually put in practice. In the *Abrégé Chronologique de l'Historie de France par Mézerai*, and in the Phil. Trans. for 1696, two cases of what is called nephrotomy are mentioned; but several circumstances in the accounts led Haller and others to conclude, that the operation alluded to in the first work was nothing more than the high operation for the stone. With respect to the example in the latter work, the particulars are not detailed enough to prove that an incision was really made into the kidney. There is no doubt that stones have often been extracted from abscesses about the region of the kidney, after being touched with a probe. But, with regard to cutting into the kidney, the deep situation of this viscous, and the want of symptoms by which the lodgment of a stone in it can be certainly discovered, will always be strong objections to the practice. When a stone, from its size, cannot pass from the kidney, and excites inflammation and suppuration, no doubt the surgeon may make an incision into the tumour, and extract the calculus. In this sense, nephrotomy is certainly a practicable operation. Warner contends that it can only be practised in such circumstances, notwithstanding whatever may have been said by Marchetti or others, upon the subject. In such a case, the operation would not be attended with any greater difficulty than the opening an abscess in any other part of the body. (See *Warner's Cases in Surgery, p.* 241, *Edit.* 4.)

NITRIC and NITROUS ACIDS. As these are medicines of considerable importance in surgery, they claim particular notice. Nitrous acid is a yellow, or orange-coloured fluid, emitting when exposed to the air, deep orange-coloured extremely suffocating fumes. It consists of nitrous gas, loosely combined with nitric acid and water, and the colour varies according to the proportion of nitrous gas which is present.

Nitric acid is a colourless, or very pale yellow, limpid fluid, emitting when exposed to the air, white suffocating vapours. It is highly corrosive, and tinges the skin yellow, the tint remaining till the epidermis peels off. The constituents of nitric acid, independent of the water, which gives it the fluid form, are 25.97 azote, and 74.03 oxygen, in 100 parts. (See *Thomson's Dispensatory, p.* 438, 439, *Ed.* 2.)

Both these acids, in a diluted state, have been extensively tried, as a substitute for quicksilver in the cure of lues venerea; and really upon looking over the mass of evidence brought forward in proof of the power which they seem to possess over this disease, it is at first difficult to entertain the slightest doubt of their efficacy. The cases adduced are numerous, some of them minutely detailed, the gentlemen who have published them, men of reputation and abilities, and (what especially claims attention) these examples of successful treatment are generally allowed to have been syphilitic, or, at all events, complaints, the differences of which from the venereal disease have not been, and could not be, specified. Whoever impartially considers the immense body of facts published by Dr. Rollo, Mr. Cruickshank, Dr. Beddoes, Dr. P. G. Prioleau, of Charleston, South Carolina, and others, exemplifying the success with which the venereal disease may be treated by the nitrous or nitric acid, must be surprised to find, that the accounts delivered by these gentlemen by no means correspond to those of some other eminent practitioners. How to reconcile these seemingly discordant statements, whether by supposing some undefined differences in the nature of the cases adduced, or some variation in the goodness of the medicine itself, ~~is indeed~~ perplexing. Nor is a solution of the question at all facilitated, by the results of later investigations, tending to prove the general curability of syphilis without mercury, or any medicine whatever; because, if we admit this as a fact the circumstance of a considerable proportion of cases not yielding, or being radically cured, when the nitric and nitrous acids are exhibited, as asserted by Mr. Pearson and others, would argue, that giving such acids is worse than leaving the disease entirely to itself. The more I reflect upon all that we know about the venereal disease, however, the more I am inclined to adopt the sentiment, that it is not one disorder, but probably many, which go under this name, their exact shades of difference not having yet been detected nor described. If this supposition be admissible, the contradictory statements, given by various authors about what their experience has taught them of this or that mode of treating the disease, may all be immediately reconciled.

The practice of exhibiting nitric acid, in lieu of quicksilver, began with Mr. Wm. Scott, a surgeon at Bombay, who is said to have been led to the experiment by a suggestion thrown out by Girtanner, that the efficacy of the various preparations of quicksilver probably depended upon the quantity of oxygen combined with them. (*Grens. Journ. d. Physick. B.* 3, *p.* 31, 1790.) In August, 1793, Mr. Scott being himself afflicted with chronic hepatitis, resolved to take a quantity of oxygen, united to some substance, for which it has no great attraction, and after some reflection, nothing appeared to him better than nitric acid. September 11th, he took at different times about a dram of the strong nitric acid diluted water. Soon after drinking it, he felt a sense of warmth in his stomach and chest; but no disagreeable sensation, nor any other material effect. The two following days the medicine was continued, the gums beginning to be somewhat red, and enlarged. He slept ill; but could lie for a length of time on his left side, which the disease of the liver had prevented him from doing during many months previous to this period. He also felt a pain in the back of his head, resembling what he had commonly experienced, when taking mercury. On the fourth day, his gums were a little tender; the headach and pain about his jaws still troubled him; but the symptoms of his liver complaint had already left him. The acid was continued on the 4th, 5th, and 6th days; the soreness of the mouth increasing, and a salivation taking place. On the 7th day, he felt his mouth so troublesome, that he took no more acid. His mouth got gradually well, and he found his health considerably improved.

Mr. Scott likewise administered the nitric acid in several cases of tedious intermittents, in two cases of diabetes, and in many syphilitic cases, with the happiest effect.

This gentleman's account of the nitrous acid was first published in the Bombay Courier of April 30th, 1796, and soon afterward republished in this country. (See "*An Account of the Effects of the Nitrous Acid on the Human Body*," *by W. Scott, in Duncan's Annals of Medicine for* 1796, *Vol.* 1, *p.* 375—383.) The hypothesis suggested by Girtanner, in 1790, that the efficacy of mercury in the treatment of the venereal disease depended upon the oxygen combined with this mineral, required but little extension to lead to the discovery of the antisyphilitic virtues of the acids. Yet Girtanner had all his attention so fixed on mercury, that it never struck him, that the principle on which he explained the efficacy of this medicine, might apply to other substances, which abound with oxygen, and are readily separable from it. This was the idea, which made Mr. Wm. Scott begin to suspect, that the nitric acid might be as efficacious as mercury in venereal cases; and as he had already observed a great analogy between the effects of this acid and mercury in the experiments which he made with the first of these medicines in his own case of chronic hepatitis, and other diseases, he ventured to recommend the trial of it in syphilis. The result was, that the acid was found not only to equal the preparations of mercury, but sometimes to surpass them; for it had the best effect in some cases where mercury had been tried in vain, and it was observed to remove the disease in less time than the common remedy. Nor were any of the inconveniences, usually known under the names of *mercurial symptoms, mercurial fever*, found to be the consequence of its employment, however long continued. With it alone many syphilitic cases are stated to have been cured, the disease not having returned at the end of two years. (See *Duncan's Annals of Medicine, &c. Vol.* 1, 1796, *p.* 383, *&c.*)

The letter from Mr. Scott to Sir Joseph Banks, describing these effects of the nitric acid in India, soon excited the attention of medical practitioners both in Europe and America, the inquiry being taken up with all the zeal which the preceding accounts were calculated to inspire. In 1797, Mr. G. Kellie, a surgeon of the navy, gave the nitric acid to five sailors affected with gonorrhœa, venereal sores, and buboes. Three of them were perfectly cured. A fourth, who had sores on the glans, and who had been much debilitated by the long use of mercury, recovered nearly his original strength, while taking the acid; but the sores were not healed, before mercury had been repeatedly exhibited. In the fifth patient, who was also scrofulous, the nitric acid contributed very essentially to heal the sores. On the whole, Mr. Kellie seems to regard this medicine as possessing very efficient power of stopping and eradicating the venereal disease. (See *Letters from G. Kellie, respecting the Effects of Nitrous Acid in the Cure of Syphilis. Duncan's Annals of Medicine for* 1797, *p.* 254, 277.)

In the same year appeared a letter, in a German periodical work (*Hufeland's Journ. der Prakt. Heilk.* 4 *Bd. p.* 356—359.,) written by Albers, giving the history of a venereal ulcer on the breast, successfully treated by the nitric acid.

The reports of Dr. Prioleau, who tried the nitric acid in the autumn of 1797, are particularly favourable to the practice. "We have seen (says he) every stage and form of syphilis cured by this medicine, and even in habits broken down by the antecedent use of mercury, under which the disorder had gained ground. The patients recovered their health and strength in a short time, without the use of diet-drinks, bark, or any other tonic medicine whatever." (See *Caldwell's Medical Theses, p.* 103, *8vo. Philadelphia*, 1805.)

The praise of the nitric acid from numerous quarters induced Dr. Rollo to try it in the military hospital at Woolwich, and in conjunction with Mr. Cruikshank to examine further into the antisyphilitic virtues of oxygenated substances. The results of Mr. Cruikshank's investigations constitute the second part of Rollo's work on diabetes, published in 1797. The medicines which were selected for the experiments, were the nitric, citric, and muriatic acids, and oxygenated muriate of potash. Of these, the nitric acid and the oxygenated muriate of potash were found to possess the greatest efficacy; the first acting in many cases with remarkable mildness; the second, with greater expedition and certainty. The new plan was tried upon young persons, affected with primary venereal complaints, who had never used mercury, and no other internal medicine was given, except opium, when required, for diarrhœa, or colic. The liquor plumbi acetatis dilutus was used as a wash for chancres. In debilitated subjects, sure and speedy good effects were observed uniformly to follow, and hence, previously to giving the acid to strong, plethoric patients, the method of preparing them for this treatment by purging and bleeding was adopted, as is alleged, with great success. In some cases, after the nitric acid had been continued, a good while without producing a salivation, the exhibition of mercury for a short time completed the cure. Mr. Cruikshank's opinion in favour of the new remedies was on the whole extremely sanguine, as he ventures to express his conviction, that they would render the employment of mercury in the cure of the venereal disease unnecessary. (See *An Account of two Cases of Diabetes Mellitus, with Remarks &c., by John Rollo, M. D. Vol.* 2, *8vo. Lond.* 1797.)

In the same year, Dr. Beddoes published a valuable work, comprising all the information, which had then transpired respecting the antisyphilitic virtues of the nitric acid, with additional communications from his medical friends. (See *Reports principally concerning the Effects of Nitrous Acid in the Venereal Disease, by Thom. Beddoes, Bristol,* 1797.) And two years afterward, the same author finished a still more comprehensive volume on the subject. (*A Collection of Testimonies, respecting the Treatment of the Venereal Disease by Nitrious Acid. Lond.* 1799.)

From the preceding work we learn, that, in the Plymouth hospital, Mr. Hammick, gave the nitric acid to between sixty and seventy venereal patients, and that the cures were generally more speedily accomplished, than with mercury, no ill effects being produced on the system, similar to those usually remaining after the use of the latter mineral. He assures us, that, after the removal of the symptoms, the disease never returned, and that for debilitated, scorbutic, or scrofulous patients, affected with venereal complaints, the acid was found a most valuable means of relief.

Dr. Geach of the same hospital is also stated to have employed the nitric acid with such effect that he rarely had occasion for mercury, the livid colour of the countenance, sordid fetid excoriations of the scrotum, and other symptoms, which had long resisted the latter mineral, all quickly giving way to the new medicine. Another practitioner of the name of Giedlestone, however, had not equal success in his experiments, for, in several cases, the acid did not bring about a cure, and, after being continued eight or ten days, and inducing a salivation, it even rendered the condition of some patients worse. On the other hand, Mr. Sandford, a surgeon at Worcester, found the acid a very useful and effectual medicine in venereal cases, where mercurials had been long exhibited in vain. The trials of the nitric acid, made by Professor Rutherford at Edinburgh, had various results; the medicine sometimes proving completely ineffectual; and, in other instances, appearing to be a perfect antidote for the worst syphilitic complaints.

Dr. Beddoes concludes with some observations in answer to Mr. Blair, who had become averse to the new practice.

In 1798, Dr. Ferriar published some remarks on the nitrous acid. (See *Medical Histories and Reflections, Vol.* 3, *p.* 290—310.) He tried this medicine, in various ways, either alone, or after, or in conjunction with, the exhibition of mercury. His inferences are, that, in the treatment of the venereal disease, the nitrous acid is useful only in protracted cases. He corroborates, however, the generally received opinion, that where the patient has been considerably reduced by the long, or injudicious employment of mercury, the nitrous acid is a most beneficial medicine.

In the same year, Mr. Blair wrote some observations on the venereal disease, and the new method of treating it. (*Essays on the Venereal Disease, and its concomitant Affections, Lond.* 1798.) In this work, the new remedies are generally condemned, as ineffectual, and hence originated a paper-war between this writer and Dr. Beddoes, "literarium certamen, non sine bile gestum," as Dr. Holst has expressed it. (*De Acidi Nitrici Usu Medico. p.* 73, *8vo. Christianæ,* 1816.) In this controversy, numerous other practitioners readily joined, as for instance, Macartney, Rowley, Philips, Hooper, Lidderdale, &c., all of whom adduced cases, in proof of the frequent inefficacy of nitrous acid, and these were collected and published by Mr. Blair, who suspecting the cases of failure with this medicine to be more numerous, than those of success, considers himself unjustified in regarding it as an antisyphilitic to be depended upon. At the same time, he bears testimony to the virtues of the acids, exhibited in venereal cases either singly, or alternately with mercury, where the patient's strength had been much reduced; and he confesses, that venereal buboes, indurated glands, nocturnal pains in the bones, and gonorrhœa, yielded to these remedies.

Seven years after the appearance of Mr. Blair's work, Mr. Pearson delivered his sentiments in a book of considerable merit. (*Observations on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea,* 2*d Ed. Lond.* 1807, *p.* 198, *&c.*) He relates a very few examples, in which the nitrous acid appeared effectual in curing chancres, and one of its virtues in gonorrhœa; the only one, which this gentleman had ever seen. The rest of his observations are unfavourable to the character of the medicine, as an antisiphylitic meriting confidence. The first trials, which Mr. Pearson made, were of the nitric acid; but, as he did not remark any of its effects to be different from those produced by the nitrous acid, he commonly employed the latter in the following form. Nitrous acid, two drachms, pure water a pint and a half, syrup four ounces. This mixture was usually taken in the space of twenty-four hours. As local applications, he employed a saturnine lotion to the sores; and emollient poultices to tumours and inflamed parts. All mercurial applications were absolutely prohibited. (*P.* 200.) In making his inferences, in a subsequent page, he says, "The nitric and nitrous acids have removed both primary and secondary symptoms of syphilis; and, in some instances, it seems that the former have not recurred, nor have secondary symptoms appeared at the period they commonly show themselves, when the cure has been imperfect. But, as far as my own experience extends, and that of many respectable friends, who are connected with large hospitals, a permanent cure has never been accomplished by these acids, where secondary symptoms have been present. The same acids, when exhibited with the utmost care and attention to many patients, labouring under the primary symptoms of the venereal disease, and where they have agreed perfectly well with the stomach, have been nevertheless found inadequate to the cure of those symptoms. Indeed, the failures which have occurred, both in my own practice, and that of many of my surgical friends, have been so numerous, that I do not think it eligible to rely on the nitrous acid, in the treatment of any one form of the lues venerea." However, Mr. Pearson joins several other writers in bearing witness to the good effects of this medicine, where impairment of the constitution renders the employment of mercury inconvenient, or improper. Here, he says, it will restrain the progress of the disease, and improve the health and strength. On some occasions, he thinks, that it may be given, in conjunction with a course of mercurial inunction, and he agrees with other practitioners about its supporting the tone of the stomach, acting as a diuretic, and counteracting the effects of mercury on the mouth and fauces. (*P.* 236—238.)

While these inquiries were going on in England, numerous experiments on the same subject were undertaken in France. In a work, published in 1797, Alyon positively declares, that mercury ought to be entirely relinquished in the cure of the venereal disease. (*Essai sur les Propriétés Médecinales de l'Oxygène, et sur l'application de ce principe dans les maladies vénériennes, psoriques, et dartreuses ; Paris, an.* 5, 8*vo.*) Here we find a relation of many cases, successfully treated in the hospitals of Val-de-Grace and St. Dennis, by the oxygenated muriate of potash, the nitric, oxymuriatic, and citric acids, an ointment of the author's own invention, called the unguentum oxygenatum, being applied to the sores. (See *Unguentum.*) In a second edition of the above book, which came out in 1799, the same doctrine and practice are corroborated by further observations.

In 1798, Dr. Swediaur brought out the third edition of his treatise on the venereal disease, (*Traité Complet sur les Symptômes, les Effets, la Nature, et le Traitement des Maladies Syphilitiques,*) in which he highly commended the virtues of the nitrous acid, and oxygenated acid, as expediting the cure, with very few exceptions. But, in the fourth edition, he retracts, and details the results of the new practice, as tried upon twenty-six venereal patients in the *Hospice d'Humanité :* of these only seven cases remained permanently cured ; the issue of seven others was doubtful ; and, in twelve, no amendment was observed.

Nor were the statements of Lagneau much more favourable to the reputation of the nitrous acid as an antisyphilitic ; for, from the trials which he had seen made of it, he concluded, that it was not unfrequently ineffectual, while it was apt to excite an obstinate cough and hœmoptysis. (*Exposé des Symptômes de la Maladie Vénérienne, des diverses Méthodes de traitement, &c. 3me Ed. Paris,* 1812.)

The reports of Dr. Odier, of Geneva, however, were rather more propitious, as he says, the nitrous acid increases the efficacy of mercury, and lessens or removes the inconveniences arising from its unskilful administration. But he candidly acknowledged, that his experience had not been great enough to enable him to pronounce, what degree of confidence ought to be put in the acid as a remedy for syphilis. (*Man. de Méd. Pratique ; Genève, p.* 249.)

The practice of exhibiting the nitric acid for the cure of syphilitic affections was not tried in Germany so soon as in England and France. Albers, however, in 1797, gave an account of Scott's successful experiments, and of the efficacy which they evinced in some cases seen by that gentleman in the Infirmary at Edinburgh. (*Hufeland Journ. d. Prakt. Heilk. Vol.* 20, *p.* 68 ;) while Behn, who had visited Paris in the winters of 1797 and 1798, briefly noticed the various results of the trials, which he had seen made of this acid, in the "Clinique de Perfectionnement," for the cure of obstinate syphilitic cases. (*Erinnerungen an Paris, zunächst für Aerzte gescrieben von G. H. Behn Erst. Heft. Berl.* 1799, *p.* 110.) At length, in 1799, Struve, who translated Mr. Blair's first publication into German, communicated to the profession the particulars of some experiments made by himself with the acid ; he declares, that he had very often found it an excellent remedy for inveterate pains in the bones, and derangement of the constitution, produced either by the syphilitic virus or the injudicious employment of mercury. However, in common cases, mercury is represented as the best antisyphilitic medicine.

Afterward Professor Würzer was induced to try the nitrous acid in a case, that had resisted mercury for six months, the patient having got rid of some chancres and a sore throat, but being left with violent nocturnal pains, blotches, and sores all over his body, and in a very reduced condition, without the least appetite. Here, in 27 days the acid, together with sarsaparilla and the warm bath, not only removed all the complaints, but actually restored the patient's original strength, and healthy appearance. In a short note annexed to this case, Hufeland gives it as his opinion, derived from experience, that the nitrous acid is effectual in obviating the sequelæ and anomalous diseases induced by lues venerea, but that it does not permanently cure the latter affection itself. (*Etwas über die Keilkraft der Salpetersaure in venerischen Krankheiten, Hufel. Journ. d. Prakt. Heilk.* 8 *Bd.* 4 *St. p.* 139—143.)

These vague and endless contradictions induced Schmidt, an eminent professor at Vienna, to make a series of experiments with the nitric acid, for the purpose of ascertaining its power in cases of syphilis. (See *Beobacht, der Kaiserl. Königl. Med. Chir. Josephs Akademie zu Wien.* 1, *Bd. Wien* 1807, *p.* 147—189.) Under his directions, the acid was given in the winter of 1799 to five soldiers, affected with the venereal disease in various degrees and forms. In every one of these cases, the medicine was found efficacious; but the degree of efficacy was remarked to vary considerably according to the nature of the constitution, and the kind of local complaints. Thus, in robust patients, moderate doses of the acid soon produced benefit; while, in weak persons, disposed to scurvy or scrofula, a larger quantity of the medicine, and more time were requisite. This assertion we see is exactly the reverse of what appeared to happen in the cases treated by Mr. Cruikshank. However, Professor Schmidt entertains strong doubts, whether the nitric acid is adequate to the cure of all the forms of syphilis, and he thinks, that neither this nor any similar medicines will ever supersede the necessity for mercury.

Ontyd, a Dutch practitioner, approves of the use of the nitric acid, with some limitation: while he admits its efficacy in removing local symptoms, he is strongly against its employment in cases of confirmed lues, as they used formerly to be termed. The latter assertion, I conceive, is exactly contrary to the results of modern experience, most of these protracted bad cases being those, which are particularly benefited by this acid. (*Nieuwe scheidekundige Bibl. te Amsterdam; by Doll*, 6*de St.* 1799, *p.* 166.) The tracts of Boetticher, (*Bemerk. über Medicinal-verfass. Hospit, u. Curarten.* 2*tes Hefr. Königsb.* 1800, 8,) of Ritter (*Erfahr über die innerl u. ausserl. Anwendung d. Salpeters. Hufel. Journ.* 10 *B.* 3 *St. p.* 191—197,) and of Frankenfeld (*Hufeland's Journ. der Prakt. Heilk.* 22 *Bd.* 4 *St. p.* 96—98) need only be specified here, as decidedly unfavourable to the character of the nitrous acid, as a remedy for syphilis.

The following German practitioners are to be classed with the moderate approvers of the medicine, though as Holst observes, (*De Acidi Nitric Usu Medico, p.* 88; *Christianæ,* 1816,) they do not appear to have made any new experiments of their own with it, viz. Munchmeyer (*Comm. de Viribus Oxygenii in procreandis et sanandis Morbis; Goett.* 1801, *p.* 54;) Burdach (*Hdb. d. neuest Entdeck. in d. Heilmittellehre; Leipz.* 1806, *p.* 11, 12;) Aronsson (*Vollst. Abhdl. aller venerischen Krankh. Berl.* 1808, *p.* 211;) Horn (*Hdb. der Prakt. Arzneymittellehre,* 2*te. Aufl. Berl.* 1805, *p.* 95;) Consbruch (*Taschb. d. Arzneymittellehre,* 2*te. Aufl. Leipz.* 1810, *p.* 283;) Toepelmann (*Neuere Erfahr. über zweckem. Behdl. venerisch. Schleim ausflüsse, &c. Leipz.* 1809, *p.* 151;) and Wollkopfs (*Pharmac. extemp. Leipz.* 1811, *p.* 92.)

Another German author, who has entered into the present inquiry, is F. A. Walch, whose statements are very unfavourable to the use of the nitrous acid, as he absolutely denies, that it ever accomplishes a lasting cure. (*Ausführl. Darstell. d. Urspr. &c. d. Venerisch. Krankh. Jena,* 1811, *p.* 197, 198.)

In a periodical work, mention is made of one case, which, after resisting a long course of mercury, and also the nitric acid, was ultimately cured by restricting the patient for a few weeks to a very reduced diet. (*Hufel. Journ. d. Prakt. Heilk.* 34, *Bd.* 2 *St. p.* 56.)

For much of the foregoing historical account, I am indebted to *Holst's Diss. de Acidi Nitrici Usu Medico,* 8*vo. Christ.* 1816; in which an explanation of the results of further trials of the medicine in Denmark and Sweden may be perused. From these countries, the reports are mostly less favourable to the reputation of the medicine, than the accounts already delivered.

According to Holst the following are the chief circumstances, under which the employment of nitrous, or nitric acid is generally sanctioned.

1. Where the disease is complicated with scurvy.

2. Where it is attended with scrofulous enlargement of the glands, and other strumous symptoms. I may remark, however, that these complaints are often as undefinable, as some of the forms of syphilis, and therefore the rule is frequently difficult of application.

3. Where the disease is accompanied with considerable debility, either brought on by mercury, or febrile indisposition.

4. Where from idiosyncrasy, mercury cannot be safely exhibited. Experience fully proves, that there are some patients, more especially females, in whom a few grains of mercury taken inwardly, or mercurial frictions on the most limited scale, bring on vomiting, rheumatic pains, nervous febrile symptoms, colic, spasms, severe headach, and a rapid immoderate salivation.

5. Where pregnant women are the subjects of the disease, several practitioners forbid the use of mercury, during the latter months of pregnancy. (*Bangii, Prax. Med. Hafn.* 1789, *p.* 570; *Swediaur; Aronsonn Vollst. Abhdl. aller Ven. Krkht. Berlin,* 1811, *p.* 211.) Holst observes, that the reason of this advice is not stated, though no doubt it must proceed from an apprehension of mercury exciting a miscarriage.

Mr. Pearson's mode of exhibiting the nitrous acid has been already mentioned. Some practitioners give it as follows: ℞. Gum. Arab. ʒiv. aquæ menth. ℥viij. acid. nitrosi, vel nitrici ʒij. ʒiij. F. M. Of this mixture, a table spoonful is to be taken every hour mixed with some sweetened water. Should the acid occasion colic, or diarrhœa, its quantity must be lessened, and opium added to the mixture.

As the nitrous and nitric acids decompose and destroy the teeth, some care must be taken to prevent so serious an effect. Their being properly diluted, and blended with sugar, syrup, or mucilage, will materially tend to hinder the evil. But the safest way is always to drink the mixture through a glass tube, and wash the mouth well immediately after every dose.

Strong nitrous acid, extricated in the

form of vapour, is often employed as a means of purifying the air of large crowded hospitals and sick-rooms; a subject on which the observations of Dr. J. C. Smyth and G. de Morveau are particularly interesting. The nitrous acid is sometimes taken by accident, or design, as a poison. Here, according to the observations of Tartra. Orfila, &c. the best antidote is calcined magnesia, or soap. If the first of these articles be at hand, a dram of it, suspended in a glass of water, is to be instantly given, followed by copious draughts of some mucilaginous drink, the design of which is to fill the stomach, and excite it to reject the diluted poison. While the vomiting is going on, the doses of magnesia are to be repeated, and followed as in the first instance by draughts of linseed tea, solution of gum arabic, milk, or broth.

The nitrous acid has also been extensively tried as a means of curing syphilitic complaints, in the form of what is termed the *nitro muriatic bath*, of which a description will be given in speaking of the *Venereal Disease.*

When reiterated courses of mercury induce dropsy, as not unfrequently happens in very impaired constitutions, Mr. Carmichael prescribes the nitrous acid, in as large doses as the stomach will bear, conjoined with digitalis. (*Essays on Venereal Diseases, &c.*) Taken in doses of eight, ten, or fifteen drops, two or three times a day, it is alleged to be efficacious in the cure of some eruptive complaints, especially of the lower extremities, connected with disorder of the liver. (*Wilson's Pharm. Chir. p.* 6.) Another well-informed writer also bears testimony to its good effects when used together with mercury, for old obstinate ulcerations of the legs, though no venereal taint can be suspected; and, he says, it may be applied with benefit as a local stimulant to fetid ulcers, attended with a thin ichorous discharge, and in some examples of caries. In such cases ʒij. of the diluted acid is to be mixed with ℥j of water. (See *A. T. Thomson's Dispensatory, p.* 441, *Ed.* 2.) With respect to caries, in the sense of *necrosis*, however, the reader will understand from what is stated in the article on that subject, that it can rarely be adviseable to apply this or any other acid either to the exfoliating portion of bone or to that which is yet alive. The nitrous acid has sometimes been used for destroying warts, condylomata, and other excrescences. By Sir E. Home it is praised as a local application for certain ulcers when properly diluted. (See *Ulcers.*) It is likewise commended by some writers as a very useful local application in cases of hospital gangrene. And an interesting paper has been just published by Mr. R. Welbank, detailing the excellent effects of the undiluted nitric acid as an application to diseases which he has described under the name of sloughing phagedœna, and which he considers as identical with hospital gangrene. "If the disease be not far advanced, (says this gentleman) I at once apply the undiluted acid, after cleansing the surface with tepid water, and absorbing the moisture with lint. Where, however, there is a thick and pulpy slough, it is better to remove as much of it as possible, with forceps and scissors, before the application is made. The surrounding parts being then protected by a thick coating of lard, or cerate, I proceed to press steadily, and, for some minutes, a thick pledget of lint, previously immersed in the undiluted acid on every point of the diseased surface, till it appears converted into a firm and dry mass. The parts may be then covered with simple dressings, and evaporation kept up externally by cooling lotions." An opiate is afterward given, and the eschar removed at the end of 16 or 20 hours. When there is no pain, and the subjacent parts present a florid healthy appearance, the sore may now be treated as a common wound, though stimulant dressings are generally best. Mr. Welbank uses the ceratum lapidis calaminaris, or a solution of the argentum nitratum, in the proportion of two or three gr. to an ounce of distilled water. But, if there is any recurrence of pain, whether the affection be slight or severe, and the remaining slough deep or superficial, Mr. Welbank advises the reapplication of the undiluted acid. (See *Med. Chir. Trans. Vol.* 11, *p.* 369.) The cases reported by this gentleman are highly favourable to the practice which, as may be seen by reference to the article *Hospital Gangrene*, is not entirely new with respect to this disease, and in speaking of *Mortification*, I have mentioned, that it was Dr. Kirkland's practice sometimes even to dress certain sloughing diseases with a solution of mercury in nitrous acid. But, notwithstanding these facts, and the well-known custom of Sir Astley Cooper to apply to sloughing phagedenic ulcers the nitric acid lotion, composed of 50 drops of the acid, and a quart of distilled water, I feel that Mr. Welbank has rendered a service to the profession by drawing their attention still more particularly to the use of undiluted nitric acid in the forms of phagedœna, which he has so well described.

NODE. A swelling of a bone; a thickening of the periosteum, or a fascia; or a tumour on a tendon, from a venereal cause. See *Exostosis* and *Venereal Disease.*

NOLI ME TANGERE. A species of *lupus*, under which term Dr. Willan intended to comprise, together with the *noli me tangere* affecting the nose and lips, other slow tubercular affections, especially about the face, commonly ending in ragged ulcerations of the cheeks, forehead, eyelids, and lips, and sometimes occurring in other parts of the body, where they gradually destroy the skin and muscular parts to a considerable depth. (*Bateman's Synopsis of Cutaneous Diseases, p.* 296, *Ed.* 3.)

Sir E. Home says, that the ulcers, for which he has been led to employ arsenic, are named, from the virulence of their disposition, *noli me tangere*, and are very nearly allied to cancer; differing from it in not contaminating the neighbouring parts by absorption, but only spreading by immediate contact. Ulcers of this kind differ exceedingly from one another in their degree of virulence; but they are all so far of the same nature that arsenic in general agrees with them, and puts a stop to their progress, while they are aggravated by milder dressings. (*Home on Ulcers, Edit.* 2, *p.* 267.)

The disease generally commences with small tubercles, which change after a time into superficial, spreading ulcerations on the alæ of the nose, more or less concealed beneath furfuraceous scabs. The whole nose is frequently destroyed by the progressive ravages of this peculiar disorder, which sometimes cannot be stopped or retarded by any treatment, external or internal.

The specific ulcerations do not generally extend to the parts far within the nostrils; but, at the time that I am writing this article, there is, under Sir L. Harvey, in St. Bartholomew's Hospital, a curious example, in which the greatest part of the nose is destroyed, and the ulceration proceeds even through the front part of the palate into the mouth. The morbid process sometimes stops for a considerable time, and then is renewed with increased violence. The following case illustrates the nature of *noli me tangere*, and one mode of treatment, to which it yielded. Jane Chatillon, 45 years of age, was attacked, in the course of September, 1788, with an inflammation on the left ala of the nose. Some time afterward the part ulcerated, which occasioned a troublesome and sometimes a painful itching; different means were unsuccessfully employed, and the case remained nearly in the same situation till the month of September in the following year. At this period the ulcer spread very fast; the septum nasi, the muscles and cartilages of both sides were, in a short space of time, destroyed. The ulceration extended on the left side, along the loose edge of the upper lip. This was the state of her case on her admission into the Hospital of St. Louis, in the month of October, 1789.

A poultice moistened with aq. veg. was applied twice a day to the ulcer; a sudorific ptisan prescribed, and a pill, composed of one grain of calomel and one grain of sulph. aurat. antimonii, ordered to be taken every day. From the fifth day, the inflammation lessened. No other sensible alteration took place till the 21st. The suppuration, which till this time had been black and putrid, now became white and inodorous.

On the 37th the discharge was trifling, and the part was dressed with pledgets dipped in a solution of verdigris and corrosive sublimate, in the proportion of six grains of each to a pint of water. On the 40th day, cicatrization began to take place, and was finished by the 60th.

Some time before the disease was completely cicatrized, an issue was made in the arm, which was healed up without any inconvenience to the patient, six months after the cure. (*Parisian Chirurgical Journal, Vol.* 1.)

One of the best external applications to *noli me tangere* is the following lotion: ℞. Kali arsenicati, gr. iv. Aq. menthæ sativæ, ℥iv. Spiritus vini tenuioris, ℥j. Misce et cola. I have seen several cases in St. Bartholomew's Hospital, which were either cured or seemed disposed to get well with this useful application. The solution of arsenic, which Sir E. Home has always used, is made by boiling white arsenic in water for several hours, in a sand heat. When given internally, the dose is from three to ten drops; when for external application, a dram is to be diluted with ℔ij. of water; and this solution is gradually made stronger, as the parts become accustomed to it, till it is of double strength. However, this mode of using arsenic is by no means a well-regulated one; and Plunket's caustic (see *Arsenic*) for outward employment, is not nearly so neat an application as the above-mentioned lotion. At St. Bartholomew's Hospital, arsenic is administered internally in the following formula: ℞. Kali arsenicati, gr. ij. Aquæ menthæ sativæ, ℥iv. Spiritus vin. ten. ℥j. Misce et cola. Dosis ʒij. ter quotidie. In this way, the quantity of arsenic is nicely determined. We shall only just add, with regard to this medicine, that, both as an external application and an inward remedy, in cases of *noli me tangere*, it perhaps deserves the highest rank. One scruple of the argentum nitratum, dissolved in half an ounce of distilled water, makes a very good application, which, although generally inferior, in point of efficacy, to arsenical ones, in the present disease, occasionally does good, when nothing else seems to produce any benefit. The above case makes us acquainted with another lotion, which deserves further trial. All fluid remedies must be applied to the part, by dipping little bits of lint in them, placing these on the ulcerations, and covering the whole with a pledget.

The ointments which seem most likely to prove useful applications to *noli me tangere*, are the unguentum hydrargyri nitrati, the unguentum picis, and unguentum sulphuris. As far as my experience extends, they are generally less efficacious than lotions in the present cases; but, in particular instances, they prove superiorly useful, and it deserves especial notice, that surgeons can often make no progress against this inveterate disease, unless they apply a different sort of dressing every day; sometimes a lotion; at other times an ointment. The little ulcers may occasionally be touched with the argentum nitratum. The small furfuraceous scabs, which are continually forming on the part affected, should be softened with a little of the unguentum spermatis ceti, and removed with as much tenderness as possible.

We have already remarked, that arsenic is a good medicine to be given internally, and the best mode of exhibiting it has been already explained. Another medicine, which is often useful in these cases, is what is known by the name of Plummer's pill, or the compound calomel pill. ℞. Hydrargyri submuriatis, sulphuris antimonii præcipitati, singulorum gr xii. Guaiaci gummi resinæ, gr. xxiv. Saponis quod satis sit Misce ; fiant pilulæ duodecim. Dosis una bis quotidie.—In other instances, we may try the decoctum ulmi, or sarsaparillæ, with one of the following pills thrice a day: ℞. Hydrargyri submuriatis gr. vj. Succi spissati cicutæ ʒj Misce ; fiant pilulæ duodecim. The hydrargyrus sulphuratus has occasionally been given as an alterative medicine, for the relief of *noli me tangere* ; with what good effect I cannot pretend to say.

In three or four less severe cases of lupus tubercles on the face, which had made no progress towards ulceration, Dr. Bateman saw the solution of muriate of barytes, taken internally, materially amend the complaint. Sometimes, also, a separation of the diseased parts from the sound has been effected with the knife, or caustic, and the progress of the complaint been stopped. (*Synopsis of Cutaneous Diseases*, *p.* 296, *Edit* 3.)

NYCTALOPIA. (from *νυξ*, night ; and *ωψ*, the eye ; or *οπτω*, to see.) An affection of the sight, in which the patient is blind in the daylight, but sees very well at night

Nyctalopia, *visus nocturnus*, or day-blindness, vulgarly called owl-sight, (says M. Lassus) is an affection in which the patient either cannot see at all, or sees but very feebly, objects, which are in the open daylight, or situations where there is a strong light ; but discerns them very well, when they are in a darkish place, or at sunset, or in the nighttime, if not immoderately dark. (See *Pathologie Chirurgicale*, *T.* 2, *p.* 539, 540.)

The Greek physicians are divided in their opinions concerning the now uncommon disease nyctalopia. Hippocrates expressly says, "we call those nyctalopes who see by night." The author of *Defin. Medic.* "that they see nothing in the daytime, but have their sight by night." On the contrary, Paulus Ægineta and Actuarius are as explicit in asserting, that they have their sight perfect in the daytime, but are blind by night. Ætius is of the same mind, though he is thought to favour the contrary opinion, when he says, "they see better by night than in the day, and if the moon shines they are blind." The author of Isagoge embraces both opinions, when he says, "they call those nyctalopes who, in the daytime, see more obscurely, at the setting of the sun more clearly, but, when it is night, much better ; or, on the contrary, by day they see a little, but, in the evening, or at night, they are blind." Galen explains the word by a night blindness. Pliny, Varro, Nonius, Festus, Celsus, and other writers, give equally opposite definitions of the disorder. Dr. Pye questions, whether these two descriptions of nyctalopia, so diametrically opposite to each other, may not be reconciled by considering the disorder as an intermittent one. The difference then will only consist in the different times of the approach of the disease ; that of Hippocrates came on in the morning ; that of Ægineta, in the evening ; both were expressly periodical, and the distance of time between the paroxysms, in both, was respectively the same ; a whole day, or a whole night. The various shapes, in which intermittents appear, very much favour, says Dr. Pye, such an opinion ; and the apparent success of bark in the case, which he has related, notwithstanding the unfavourable circumstances of the evacuations his patient laboured under, and the consequent necessity of its disuse, seem to confirm it in this gentleman's mind. (*Med. Obs. and Inq. Vol.* 1.)

In this work I shall follow Callisen, Richter, and the best modern surgical writers, in calling day-blindness, *nyctalopia*, and night-blindness, *hemeralopia*. (See *Callisen*, *Syst. Chir. Hodiernæ*, *Vol.* 2, *p.* 392 ; and *Richter*, *Anfangsgr. der Wundarzn. B.* 3, *p.* 479.)

Nyctalopia, in the sense of day-blindness, is a very rare disease, in comparison with hemeralopia, which is a very common disorder in warm climates. According to Dr. Hillary, there are a people in Siam, in the East Indies, and also in Africa, who are all of this cat-eyed species, or subject to the disease of being blind in the daytime, and seeing well by night. (*Mod. Univ. Hist. Vol.* 7.) The same author notices the general rarity of the disorder, and mentions his having met with but two examples of it.

With respect to the causes of the complaint, Dr. Hillary observes, that it proceeds from too great a tenderness and sensibility of the iris and retina. M. Lassus thinks the causes may be of different kinds. "If, for instance, (says he) there were a very small opacity, like a point, exactly opposite the pupil, or centre of the crystalline lens, the pupil, contracting in the open daylight, would stop the entrance of the rays of light into the eye, and a day-blindness arise, which would be diminished by the expansion of the pupil in the shade. Here, the cure would depend upon the removal of the opacity.

"Persons, whose pupils do not move freely, but remain much dilated, and do not sufficiently contract in light situations, are also affected with nyctalopia ; for, so large a quantity of the rays of light pass into their eyes, that it serves rather to destroy, than assist vision. Such persons see tolerably well, and better than the preceding class of patients, in a darkish place, and they ought to wear green spectacles in the daytime, in order to weaken the impression of the rays of light. When a person is shut up a long while in a dark place, the pupils become habitually dilated, and if he exposes himself suddenly and incautiously to a strong light, the eyesight may be destroyed. There are other individuals, who, from excessive sensibility of the iris, cannot bear much light ; their pupils instantly contract, and close. This case (continues M. Lassus) may be brought on by too great indulgence in venereal pleasures, and in persons, who have debilitated their constitutions during their youth." The same author mentions other cases, which seem to depend upon a species of irritability of the iris. In one instance, an issue in the arm effected a cure, and he mentions the utility of blisters. He admits likewise with Dr. Pye cases of intermittent or periodical nyctalopia, which begin regularly in the morning, and go off in the evening, the patient continuing blind, whether he keep himself in a dark or a light place. The cause of these instances, which, he observes, are very uncommon, is generally seated in the primæ viæ, and requires emetics, resolvents, purgatives, and bark. (See *Pathologie Chir. T.* 2, *p.* 540—542. Also *Richter, Anfangsgr. der Wundarzn. B.* 2, *p.* 481.) In 1787, Baron Larrey met with a case of day-blindness in an old man, one of the galley-slaves at Brest, who had been shut up incessantly for thirty-three years in a subterraneous dungeon. His long residence in darkness had had such an effect on the organs of vision, that he could only see in the dark, and was completely blind in the daytime. (See *Mém. de Chir. Militaire, T.* 1, *p.* 6.)

Nyctalopia may sometimes depend on a peculiarity in the structure and organization of the eye; by reason of which, the quantity of light, which only suffices for vision in an eye of natural formation, proves too abundant for a nyctalops, and absolutely prevents him from seeing at all. We know, that in the eye there is a black substance, named the *pigmentum nigrum;* one supposed use of which is to absorb the redundant rays of light, which enter the pupil. A deficiency of it might perhaps account for a nyctalops being blinded with daylight, and seeing best at night.

For an account of nyctalopia, in the sense of night-blindness, refer to *Hemeralopia.*

O.

ŒDEMA. (from οἰδέω, to swell.) The ancients understood, by this term, all kinds of tumours; but it is now restricted to a swelling, arising from the effusion of a serous fluid in the cellular substance of a part; the affection, when more extensive, and accompanied with a general dropsical tendency, becoming a medical case, and receiving the name of *anasarca.* An œdematous part is usually cold, and of a pale colour; and, as it is little, or not at all elastic, it *pits,* as surgeons express themselves, or, in other words, it retains, for some time, the mark of the finger, after being handled, or pressed. Œdematous swellings are often connected with constitutional causes. In many cases, however, they seem to be entirely local affections, arising from such causes as only act upon the parts, in which the swelling is situated. Thus we observe, that after violent sprains of the wrist, or ankle-joint, the hands and feet often become œdematous; and limbs are frequently affected with œdema, in consequence of the return of blood through the veins being obstructed by the pressure of tumours on them, or that of splints, bandages, &c. Pregnant women are known to be particularly subject to œdema of the legs, owing to the pressure of the gravid uterus on the iliac veins. Persons who have been confined in bed, with fractured thighs, or legs, generally have more or less œdema in their feet and ankles, on first getting up again; and the affection in these cases is probably quite dependent on loss of tone in the vessels of the limb.

In the treatment of œdema, great attention must always be paid to the nature of the cause, in order to determine whether the disease originates from a mere local, or a general constitutional affection. When it depends on the pressure of a tumour on the veins, as we often see happen in cases of aneurisms, the effect cannot be got rid of till the cause is removed; and the aneurismal swelling must be lessened, before the œdematous one can admit of the same beneficial change. When œdema is the effect of vascular weakness in a limb, in consequence of sprains, contusions, &c. the best means of relief is to support the parts affected, with a laced stocking or a flannel roller, while they are also to be rubbed with liniments, and bathed with cold spring water, till they have perfectly recovered their tone.

With regard to the œdema, attendant on the advanced stage of pregnancy, a complete cure cannot be expected till after delivery. The affection is generally more considerable in the afternoon than the morning, owing to the different effects of an erect and a recumbent position. Some relief may be obtained by the patient's keeping as much as possible in a horizontal posture; and, when much inconvenience and pain are felt, the parts may be fomented with any aromatic or spirituous application.

Frequently, œdema is one of the symptoms of suppuration, and, when the collection of matter is very deeply situated, sometimes leads to its discovery, as is exemplified in cases of empyema.

There is a species of œdema, accompanied with a degree of heat, pain, &c. in the part, and which, in short, seems combined with phlegmon. In this case, cold evaporating lotions, the application of leeches, and the exhibition of saline purgatives, are proper. An erysipelatous œdema is also met with, in which the treatment should very much resemble what is explained in the article *Erysipelas.*

ŒSOPHAGOTOMY. (from *œsophagus* and τέμνω, to cut.) The operation of cutting into the œsophagus, in order to take out of this tube any foreign body which lodges in it, and can neither be extracted through the mouth, nor pushed down into the stomach, though its removal is absolutely necessary for the preservation of the patient's life. A substance, above a certain size, lodged in the upper part of the œsophagus, not only obstructs deglutition, but by its pressure against the trachea, produces the most urgent symptoms of suffocation. In this circumstance, if relief cannot be expeditiously afforded in any other manner, and *the situation of the foreign body is denoted by a prominence distinguishable in the neck*, œsophagotomy should be practised without delay. However, when the symptoms are pressing, yet unattended with any possibility of feeling the foreign body, either externally or with a probang, desperate as the situation of the patient may be, modern surgeons do not sanction the practice. And this difference from the opinion of the first proposers of œsophagotomy, does not arise so much from any reflections upon the greater difficulty of the operation in this circumstance, as from the consideration of its being unlikely to answer the only purpose, which makes its performance at any time proper, viz. enabling the practitioner to extract with reasonable certainty the substance, whose continuance and pressure in the œsophagus are the immediate cause of the patient's danger. Hence, when the symptoms of suffocation are extremely urgent, but the foreign body produces no external prominence in the neck, the surgeon should in the first instance perform tracheotomy, so as to obviate the imminent peril arising from the impeded state of respiration, and afterward try such measures for the removal of the substance lodged in the œsophagus as experience points out as most likely to prove successful. Though œsophagotomy was cursorily mentioned by Verdue in his "Pathologie Chirurgicale," Guattani, formerly a distinguished surgeon at Rome, is entitled to the honour of having published the first valuable observations on the subject. (*Mém. de l'Acad. de Chir. T.* 3, *4to.*) Guattani proved by experiments, that the operation might be safely performed upon dogs, which recovered after it very well, and he demonstrated on the dead body, that it was equally practicable on the human subject. Nay, what is still more to the point, he brought forward two instances, in which the practice had been successfully adopted on living patients. "In May, 1738, Goursauld, a surgeon at Coussat-Bonneval, in Limousin, was called to a man, in whose œsophagus a bone was lodged, an inch long and half an inch broad. Various ineffectual endeavours were made to force it down into the stomach, and, *as it was perceptible on the left side of the neck*, Goursauld ventured to make an incision for its extraction. The bone was thus easily taken out, no bad symptoms followed, and the wound healed up favourably with the aid of an uniting bandage. For six days the patient was not allowed to swallow any kind of food, but was nourished entirely with clysters. According to Morand, a similar operation was performed, with equal success, by Roland, surgeon-major of the regiment of Mailly." (*Mem. de l'Acad. de Chir. T.* 3.)

Although the deep situation of the œsophagus, among the most important parts in the neck, makes œsophagotomy an operation of considerable delicacy in the hands even of a skilful surgeon, and one of great danger in those of a man, deficient in anatomical knowledge, and ignorant of the right way of proceeding, yet the propriety of performing it, under the circumstances, which have been specified, is universally admitted. When, however, I refer to the delicacy and difficulty of the operation, I am meaning a case, in which a deliberate dissection is made down to the œsophagus, without any guidance from the projection of the foreign body within it; a case, in which my views of the subject lead me to think, contrarily to Guattani, that the experiment would generally be attended with no practical benefit; which is also the sentiment of Baron Boyer. For, with respect to opening the œsophagus, with the view of tracing a substance in it, not externally perceptible, and either of taking hold of the same substance with forceps, or pushing it down into the stomach with other instruments, introduced through the incision, as suggested by Guattani, the chances of success must be too small to justify a practice, in which it is above all things of consequence to have the guidance afforded by the prominence in the throat, as a test of the foreign body being actually lodged in the œsophagus, and capable of being removed from it by the proposed operation. Indeed, the uncertainty of being able to reach and extract the foreign body, when its precise situation is not indicated by any external swelling, appears to me an objection of greater validity, than any consideration either of the increased difficulty of cutting into the œsophagus under these circumstances, or of the usual consequences of such an incision, after it has been accomplished; because the practicable nature of the operation, and the tendency of wounds of the œsophagus to heal favourably, when not complicated with other mischief of too serious a description, are facts proved beyond the possibility of dispute. In attempts at suicide and murder, and in cases of gunshot injury, the œsophagus is sometimes wounded, together with other parts in the neck, and yet the patients frequently recover; and, when they die, their fate seems to depend rather upon other unfavourable circumstances in their cases, than upon the accidental injury of the gullet. The cures of wounds of the neck, involving the latter tube, as well as the trachea, are reported by numerous writers, B. Bell, Desault, Bohnius, &c. and some have fallen under my own observation. If it were necessary to substantiate this point further, I might cite the instance, recorded on the authority of Dr. James Johnson, where a man recovered after the larynx had been completely severed between the thyroid and cricoid cartilages, and one half of the calibre of the œsophagus divided. (See *Hennen's Military Surgery, p.* 364, *Ed.* 2.) But, supposing a wound of the œsophagus, abstractedly considered, were more dangerous, than it really is, the question of the propriety of œsophagotomy would not be materially affected by it, because the operation is never recommended, except as a matter of necessity, and without which the patient would have no chance of preservation.

As the œsophagus does not descend exactly in a straight line, between the trachea and vertebræ, but inclines rather to the left side of the spine, Guattani directs the left side of the neck to be preferred for the performance of œsophagotomy. But, Boyer has justly remarked, that as the operation should never be attempted, unless there be projection of the foreign body, the place for the incision is always to be determined by the situation of the projection, the left side being chosen only when the prominence is either most distinguishable there, or at all events not less, than on the opposite side of the neck (*Traité des Mal. Chir. T. 7. p.* 192.)

The parts, which cover the œsophagus, from the middle and external part of the neck to the upper part of the sternum, are the skin, fat, cellular substance, muscles proceeding from the sternum to the larynx, the thyroid gland, the thyroid arteries and veins, the trachea, the recurrent nerve, &c. Guattani, who preferred the left side of the neck, recommended the following mode of operating. The patient is to sit on a chair, with his head inclined backward, and steadily supported by an assistant. The skin having been pinched up into a transverse fold, an incision is to be made in the integuments from the upper part of the sternum. The cellular substance, between the sterno-hyoideus and sterno-thyroideus muscles and trachea, is next to be divided. With two blunt hooks, the lips of the wound are to be kept open; and, on separating the cellular substance at the side of the trachea with the aid of the finger and a few strokes of the knife, the œsophagus will be seen. The lower part of this tube is then to be opened, and the wound in it enlarged with a pair of curved blunt-pointed scissors, a director being employed, if any difficulty arise. With a small pair of curved forceps, similar to those used for the extraction of polypi, the foreign body may then be removed. According to Guattani, the wound will serve for the extraction of the foreign body, whether this be situated above, or below it, and he asserts, that the opening will even be useful, when the extraneous substance has passed so far down, that it cannot be taken out, as it can now be easily pushed into the stomach. Guattani lays great stress on the usefulness of endeavouring to unite the wound, and adverts to his experiments, proving that, in animals, wounds of the œsophagus heal very favourably. If, says he, the vein, which brings back the blood from the inferior parts of the thyroid gland, and runs into the subclavian, happen to be cut, the hemorrhage may be stopped with a dossil of lint held upon the aperture in the vein during the operation, and afterward if the bleeding continue, compression, or a ligature, is to be employed. The recurrent nerve, if at all likely to be touched with the knife, is to be cautiously drawn a little out of the way with the blunt tenaculum. Guattani also particularly insists upon opening the œsophagus as near as possible to the trachea, especially at its upper part, where the artery, which goes from the subclavian to the thyroid gland, sometimes runs. When the foreign body requires an ample opening, and particularly when the thyroid gland is enlarged, Guattani approves of separating this part a little from the side of the trachea. (See *Mém. de l'Acad. Chir. T.* 3, *4to.*)

There can be no doubt, that Guattani's directions for finding the œsophagus are very good; but his chief defect is representing the place for the incision as being always the same, whereas it ought to be partly regulated by the situation of the foreign body itself. However, his advice to make the incisions close to the trachea appears to me more judicious, than that recently delivered by Boyer, who directs them to be made through the cellular substance between the sterno-hyoideus and sterno-thyroideus muscles, and the omo-hyoideus, (see *Traité des Mal. Chir. T.* 7, *p.* 193, *8vo. Paris,* 1821,) in which method, he quits the trachea, which is the best guide to the œsophagus, and approaches unnecessarily the large blood-vessels of the neck. Yet, I agree with Boyer, respecting the general impropriety of attempting œsophagotomy, when the situation of the foreign body is not indicated by any prominence in the neck, and the prudence of determining the place of the incision in a great measure by such projection. Boyer also cautions the operator to let his incisions always be made in such manner, as to leave unhurt the trachea and recurrent nerve at the inner edge of the wound; the carotid and internal jugular vein at its outer edge; the superior thyroideal vessels, above; and the inferior ones, below. With this view, the cellular substance is to be slowly divided layer by layer, and the blood repeatedly absorbed with a sponge; but, if any vessel bleed freely, it is to be immediately tied.

After the operation, an elastic gum catheter should be passed from one of the nostrils down the pharynx and œsophagus, by which means, the requisite food and medicines may be injected into the stomach, without any risk of their passing through the incision, and retarding the cure. But, a still stronger motive for this practice is the avoidance of the convulsive action of the muscles in deglutition; a source of very hurtful disturbance to the parts. Before the advantages of this contrivance were duly appreciated, the patient, for the first week, was allowed to swallow scarcely any thing, and was kept alive with broths injected up the rectum.

ŒSOPHAGUS, *Foreign bodies in the.* There are few situations, in which foreign bodies lodge more frequently, than in the œsophagus; a fact, explicable by the consideration of the function of this tube, the nearness of part of which to the windpipe at the same time accounts for the frequent danger of suffocation, when a substance, above a certain size, is lodged in it. The lodgment often takes place at the lower part of the pharynx, or beginning of the œsophagus, and sometimes just above the diaphragm; but very rarely in the intervening portion of that canal.

Foreign bodies, liable to lodge in the œsophagus, are not only articles of food, such as pieces of crust, or meat imperfectly chewed, the yolk of an egg, boiled very hard, and not masticated, a chesnut, or small apple, &c.; but also various substances, which are accidentally swallowed either alone, or together with the food, such as pieces of bone, stones, pins, needles, buttons, pieces of money, knives, forks, scissors, spoons, keys, &c. These latter articles, by lodging in the pharynx, or œsophagus, may occasion very bad and fatal symptoms, and, if forced down into the stomach, may produce effects of a not less serious description. Hence, an immediate attempt should always be made to extract them. For this purpose, the fingers may be employed, and, if they will not reach far enough, a pair of long curved forceps should be used. But, no instrument seems better calculated for cases, in which the body lodged in the œsophagus is not too wide, than the urethra-forceps, invented by Mr. Weiss, of the Strand, and used by Sir Astley Cooper for the removal of calculi under a certain size, from the bladder. (See *Med. Chir. Trans. Vol.* 11.) Nooses of wire, and bunches of thread with a multitude of nooses, fastened upon the end of a probang, and a piece of sponge fixed on the extremity of the same instrument, or on that of the strong wire stilet of a long elastic gum-catheter, and various other contrivances have been made with the view of extracting different articles from the œsophagus. The bunch of thread seems well calculated for catching hold of small substances, like fish-bones, needles, &c.; and the sponge, when expanded with moisture and withdrawn, will sometimes bring up articles, which on its introduction, it had passed in its dry and diminished state. When the stomach is full, the excitement of vomiting has sometimes answered; but, if the foreign body be sharp and pointed, the method is not free from danger, and, instead of relieving the patient, may put him to great pain, and bring on violent inflammation of the passage, and the most distressing symptoms.

When the substances are not of a very hurtful kind, and cannot be extracted, they must be pushed down into the stomach with a large bougie, or a whalebone probang, fifteen or sixteen inches long, and on the end of which a piece of fine sponge is securely fastened. But such practice is not adviseable, when the foreign bodies have a sharp, pointed form, so as to be likely to prove a source of at least equal danger and suffering, if placed in contact with the inner surface of the stomach. Experience proves, that hard, angular substances, and pointed bodies, like nails, pins, needles, &c. which surgeons have not ventured, or not been able, to force down into the stomach, have often made their way after a time to the surface of the body, where an abscess has formed, out of which they have been discharged.

When very hard, irritating bodies have either passed of themselves, or been pushed with a probang into the stomach, their ill effects should be counteracted, and their passage through the bowels promoted, with mucilaginous draughts, containing the oleum amygdalarum or oleum ricini. When the substances, lodged in the œsophagus, can neither be extracted, nor pushed down into the stomach, if respiration be not dangerously obstructed, and liquids can yet be swallowed, the wisest plan is to avoid irritating the passage with the further use of instruments, and leave the case to nature, that is to say, as far as manual interference is concerned; for, bleeding, and macilaginous oily draughts, may be in some cases useful. But, when the lodgment of a foreign body in the œsophagus dangerously obstructs respiration, and the substance itself can be felt externally, the patient would perish, if some means of facilitating the breathing were not immediately adopted; and, under these circumstances, perhaps, the most prudent plan would be to make an opening in the trachea. (See *Bronchotomy.*) The subsequent treatment, with reference to the foreign body itself might be determined by the circumstances of the case.

In this part of surgery, one fact deserves to be particularly remembered, which is, that after a sharp, hard substance has been either ejected, or propelled into the stomach by nature, or art, the same painful sensations in the throat frequently continue a certain time afterward, which were experienced while the foreign body was actually lodged in the passage. These sensations, however, are only owing to the manner, in which the œsophagus has been irritated, and, consequently, would be seriously aggravated by the further unnecessary introduction of probangs, and other instruments.

There may be cases, in which the patient would lose his life by suffocation, if a foreign body of considerable size were not taken out of the œsophagus, so as to remove the compression of the trachea. Here, if it could neither be extracted, nor pushed into the stomach by common means, and its situation were indicated by any hardness, or prominence in the neck, an operation would be necessary for its removal. (See *Œsophagotomy.*)

A foreign body, not large enough to cause danger of suffocation by pressure on the trachea, may yet bring on fatal symptoms, as is exemplified in a case, which fell under the notice of Guattani. As a man was throwing up a boiled chesnut in the air, and catching it in his mouth, it passed down his throat, and he was immediately seized with a difficulty of swallowing, and sent to the hospital.

However, as he breathed and spoke with facility, and had vomited since the accident, which happened when he was tipsy, the story of his having swallowed the chesnut was disbelieved. His symptoms grew worse, and he died on the 19th day. Guattani made an incision in the left side of the neck, below the larynx and thyroid gland, which was considerably swelled, and soon came to a large abscess, formed around the portion of the œsophagus enclosing the chesnut.

When the extraneous body is sharp and pointed, so as to stick in the mucous membrane of the passage, and it cannot be removed, nature will sometimes expel it herself, without any dangerous symptoms being the consequence. The foreign body is gradually loosened by ulceration, and is then either ejected by vomiting, or descends into the stomach, whence it is voided either through the bowels with the fæces, or, as is more common, by making its way through some part of the alimentary canal, and approaching the surface of the body, where an abscess forms, out of which it is discharged. In other instances, foreign bodies, like pins and needles, which cannot be removed, pierce the œsophagus itself, gradually pass completely out of this canal, and afterward travel to remote parts of the body, without exciting much inconvenience, until, perhaps, at the end of some years, they come near the surface of the body, in a very remote situation from the throat; and an abscess is produced, in which they are unexpectedly found. However, this transport of sharp-pointed substances from one part of the body to another, which is effected by a process, in which the absorbents have a principal share in the work, is not conducted in every instance with so little disturbance, and, when foreign bodies of this description come into contact with particular organs, symptoms of a dangerous and fatal kind may be excited.

The great art of passing any instrument down the œsophagus, for surgical purposes, consists in putting its extremity at once directly against the posterior part of the pharynx, and keeping it closely against the vertebræ so as to avoid touching the epiglottis. The knowledge of this circumstance will be found extremely useful in passing probangs and bougies. When elastic gum-catheters are intended to be left in the passage, they are introduced down the pharynx from one of the nostrils, and, being secured, they serve for the conveyance of liquid food and medicines into the stomach with great advantage, in many cases, either where the patient cannot swallow at all, or where the disturbance of swallowing would be attended with considerable harm. When, however, the plan is not to leave the instruments introduced, as Boyer observes, they may be passed through the mouth.

ŒSOPHAGUS, *Strictures, and other Diseases of the.* Properly speaking, a difficulty, or impossibility, of swallowing should not be regarded as a disease itself; but only as a symptom of different affections, to which the organs of deglutition are liable; or of other diseases, which affect parts in the vicinity of the pharynx and œsophagus. The object of the present article is not the consideration of all the diseases, which may produce dysphagia, as a symptom, but chiefly to notice this effect, as depending upon spasm, paralysis, or some morbid change of structure affecting the pharynx or œsophagus.

Spasmodic dysphagia, as Baron Boyer has remarked, principally occurs in nervous individuals, hysterical females, and hypochondriacal men. It is sometimes an attendant on fevers; it is declared to be constant in hydrophobia, and epilepsy, and occasionally present in particular forms of mania. (*Traité des Mal. Chir. T.* 7, *p.* 151.) However, with respect to hydrophobia, the foregoing assertion should be received with some qualification, for reasons so fully detailed in another part of this work (see *Hydrophobia*,) that it is unnecessary here to dwell upon the subject. Spasmodic dysphagia is said also to be sometimes a consequence of taking cold drink, after a violent fit of anger; of strong impressions on the imagination; of worms in the stomach, &c.

When the spasm is situated in the pharynx and upper part of the œsophagus, and is considerable, neither solids nor liquids can be swallowed, and the patient has great pain and a sense of constriction in his throat. When he tries to swallow any thing soft, or even fluid, he is seized with acute pain, insufferable nausea, and violent agitation of the whole frame. In this case, the spasm is never restricted to the pharynx and upper portion of the œsophagus, but extends to other organs, the inability of swallowing coming on in the midst of numerous other spasmodic symptoms, exceedingly complicated, and sometimes of a very alarming nature. When it is the middle, or lower, part of the œsophagus, which is concerned, as is frequently the case in hysterical women, the food passes through the pharynx and unaffected portion of the œsophagus with tolerable facility; but, as soon as it reaches the seat of the spasm, it is either stopped, or descends further with great difficulty and effort. Liquids, especially when warm, and swallowed slowly in small quantities at a time, usually pass down with more ease, than solid substances. When the matter to be conveyed into the stomach reaches the point of obstruction, the generality of patients are attacked with pain extending along the spine between the shoulders, and sometimes shooting to the stomach, which is considerably disturbed, and often discharges its contents. In some cases, however, no such pain is experienced, and whatever the patients try to convey into their stomachs regurgitates quietly into their mouths. Although spasmodic dysphagia is mostly complicated with other marks of disorder of the nervous system, it is sometimes unattended with any particular impairment of the health. (*Boyer, T.* 7, *p.* 152.)

As the treatment of spasmodic affections of the pharynx and œsophagus belongs rather to the physician than the surgeon, I shall be very brief on the subject. This removal of the cause of the infirmity, that is to say, of the particular state of the mind, or constitution, giving rise to the spasm, is the principal thing, at which the practitioner should first aim. Thus, Boyer cured an hysterical woman of a difficulty and dread of swallowing solid food by attending her, at her meals twice every day for a month, and gradually convincing her of the absurdity of her apprehension of being suffocated by attempting to swallow solid aliment. (*Vol. cit. p.* 154.) Sauvages makes mention of an hysterical female, whose difficulty of swallowing was cured by a regimen consisting of regular exercise, cold bathing, and milk-diet. The most successful remedies, however, are said to have been camphor in large doses, and opium taken in draughts, or pills, or administered in clysters; blisters and cupping-glasses applied to the nape of the neck, or to the epigastrium. Anodyne embrocations are also stated to have been useful. At the present day, the common idea, that many anomalous affections depend upon disorder of the liver and digestive organs, leads to the frequent employment of the compound calomel pill, and decoct. sarsaparilla, with draughts of senna, rhubarb, and gentian *pro re nata.*

Dysphagia may originate from a weakened, or paralytic state of the muscular fibres, which enter into the structure of the pharynx and œsophagus. The affection may be either symptomatic, or idiopathic. The first case frequently occurs in febrile diseases, and is generally set down by writers, as a very unfavourable omen. The idiopathic form of the complaint may be complete, or incomplete, and is chiefly seen in persons of advanced age, though occasionally the patients are young and in the prime of life. The causes may be said to be little, or not at all understood, and the only remark, which can be safely made respecting them, is, that they are usually connected with constitutional derangement.

With regard to the symptoms of paralysis of the œsophagus, when the disorder is complete, deglutition is absolutely prevented, and, if the patient tries to swallow, the food lodges in the pharynx, and sometimes produces violent fits of coughing. Some patients eat solid substances with moderate facility; but, find more or less difficulty in taking liquids. Others can swallow hastily a large quantity of fluid at a time, yet, cannot drink slowly and a little at once. Morgagni relates an instance of still greater singularity, which was an ability to swallow all kinds of food very well, except the last mouthful, which always remained in the œsophagus until the next repast. (*De Sed. et Caus. Morb. Epist.* 28, *art.* 14.) In cases of dysphagia from paralysis the patient suffers no pain, nor sense of choking; if the neck be examined, no hardness nor swelling can be felt; and a probang descends down the gullet without the slightest impediment. (*Boyer, T.* 7, *p.* 158.)

In its duration and termination, dysphagia from paralysis presents considerable variety: the complete paralysis sometimes proves rapidly fatal, not however, as I conceive, on account of the affection of the œsophagus alone, but other complications, and the exhaustion arising from inadequate nutrition. Thus, Tulpius relates an instance, in which a woman died on the seventh day from the commencement of the inability to swallow, notwithstanding every endeavour was made to support her with nourishment thrown up the rectum, which was the only thing that could be done, as she would not allow a tube to be passed down the œsophagus. In other cases the patients live a considerable time, and afterward perfectly recover, and this sometimes under the disadvantage of having been entirely supported for several weeks with broth-clysters, as we find exemplified in a case recorded by Ramazzini. Certain examples are also reported, in which the patients had their food forced into the stomach by means of probangs, for years; and either ultimately recovered their power of swallowing, or in this manner prolonged their days, without any cure taking place. (*Stalpart van der Wiel, Vol.* 2, *Obs.* 28; *Willis, Pharm. Rat. Sect.* 2, *cap.* 1, *p.* 45.)

Paralysis of the œsophagus is to be treated on the same principles, as other paralytic affections; a subject, which I shall not be expected to discuss; but, it is of importance that practitioners recollect, in these cases, the very essential service derived from the use of elastic gum-catheters, with which the requisite food and medicines may be injected into the stomach.

Dysphagia from organic disease, or morbid change of structure, is the most frequent case, and generally the most difficult of cure. In dissections, the parietes of the œsophagus are often found considerably thickened, indurated, and scirrhous, or sometimes almost cartilaginous, and even ossified. The parts, where the pharynx terminates in the œsophagus, and where the latter tube joins the stomach, are occasionally converted into thick scirrhous rings with or without ulceration, exactly in the same manner as the pylorus. But, such diseases are not restricted to those parts of the œsophagus, but sometimes occupy other points of the passage. However, the organic disease, producing a difficulty, or impossibility of deglutition, is not always situated in the coats of the œsophagus itself; for the parts, surrounding this canal, are subject to various diseases which may have the same effect. Thus, dysphagia may depend upon enlargement of the thyroid gland; tumours formed between the trachea and œsophagus, or at some other point near the latter tube; swelling and induration of the thymus gland; aneurism of the aorta; enormous enlargement of the liver; and diseased lymphatic glands in the vicinity of that portion of the œsophagus, which is covered by the peritoneum, and the largest of which glands are situated near the fifth dorsal vertebræ, just at the point where the œsophagus inclines a little to the right side to make way for the aorta. (*Boyer, T.* 7, *p.* 162.)

This last author sets down every case of dysphagia, depending upon organic disease of the œsophagus, as incurable; and with respect to the cure of other examples, in which that tube is compressed by swellings in its vicinity, as these are almost always beyond the power of medicine and surgery, the prognosis is nearly as unfavourable, as where there is a change of structure in the œsophagus itself. There are no unequivocal symptoms, by which a case of dysphagia from enlargement of glands in the vicinity of the œsophagus can be known from several other forms of the complaint. Hence, it is difficult to estimate the correctness of certain cases, recorded by Ruysch (*Advers. Anat. Med. Chir. Dec* 1, *art.* 10, *p.* 24.) and Haller (*Opuscul. Pathol. Obs.* 78.) where dysphagia, stated to have been produced by enlarged lymphatic glands, was cured by mercurial frictions, or pills composed of calomel, aloes, and camphor. As Boyer justly remarks, these accounts of the nature of the diseases, thus cured, are the more doubtful, inasmuch as the resolution of chronic swellings of lymphatic glands, even when externally situated, is very difficult, and frequently impracticable, notwithstanding the use of topical applications may here be combined with the exhibition of internal medicines. (*T.* 7, *p.* 169.) However, dismissing the question, whether the cases really arose from the pressure of enlarged lymphatic glands, or not, the facts of the cures having taken place, under the use of mercurial medicines, are of themselves interesting. Several writers consider, that there is a great analogy between certain forms of constriction of the œsophagus, and strictures of the urethra, and Mauchart recommended the two diseases to be treated, on the same principles, with bougies, and elastic gum-catheters. Baron Boyer, however, represents this doctrine as completely erroneous, declaring that the affection of the œsophagus is of the nature of scirrhus, and absolutely incurable. He relates one case, in which a woman's life was prolonged by the use of an elastic gum-catheter, though it proved of no service as a means of permanently dilating the diseased part; and, notwithstanding nourishing liquids were plentifully injected into the stomach, the patient suffered a good deal from hunger, and died exhausted about three years after the beginning of the disorder. This case, however, cannot be received, as a proof of the inefficacy of bougies for what is commonly implied by a stricture of the œsophagus, because the nature of the disease was not ascertained by an inspection of the œsophagus after death, and the case might have depended upon some organic disease either of this tube, or the parts in its vicinity not classed by the generality of modern writers with strictures of the passage.

The following are some of Sir Everard Home's sentiments, respecting these last cases.

As the œsophagus is required to be wider at one time, and narrower at another, in order to be fitted for conveying the different kinds of food into the stomach, it is nearly under the same circumstances, with respect to the formation of stricture, as the urethra. For obvious reasons, strictures of the œsophagus are much less frequent than those of the urethra. However, they are by no means uncommon, and produce symptoms even much more distressing and dangerous, than those, which ordinarily arise from analogous obstructions in the passage for the urine.

Of course, the most remarkable symptom of a stricture in the œsophagus is the difficulty of swallowing, which must be greater or less, according as the obstruction is more or less complete. Sometimes no solid food whatever can pass down into the stomach, and fluids can only descend with great difficulty, and in very small quantities. This is, in some instances, attended with considerable pain, which extends along the fauces to the basis of the skull, and through the eustachian tube to the ear. The pain sometimes returns at intervals, and lasts a considerable time, even when no effort is made to swallow. If a bougie of proper size be introduced down the pharynx, it will often be stopped by the stricture just behind the thyroid, or cricoid cartilage; for from Sir Everard Home's remarks, it appears that the obstruction is generally as high up as this situation. However, there are other cases, in which the obstruction is only of a spasmodic nature, and in these a bougie may be passed quite down. It is curious, that strictures high up in the œsophagus, often occasion ulceration in this tube very low down towards the stomach, just as strictures in the urethra occasion ulceration in that passage towards the bladder. This is most apt to occur, when strictures of the œsophagus have been of long continuance, and may arise from the efforts in retching, which frequently come on, and must strain the parts already deprived of their natural actions, and of the benefit of the secretions, with which they are lubricated in a healthy state. When such ulceration takes place, the characters of the original disease are lost; and when the ulceration extends upwards, the stricture itself may be destroyed. A bougie, introduced under such circumstances, will, in general, have its point entangled in the ulcer; and when so skilfully directed as to go down into the œsophagus, it will meet with a difficulty while it is passing the commencement of the ulcerated part of the œsophagus, and another impediment where it leaves the ulcer, and enters the sound portion of the œsophagus below. These two resistances may lead to the supposition, that there are two strictures, while in fact there is not one, only ulceration as above described.

Strictures in the œsophagus are sometimes so complete, that swallowing even fluids is utterly prevented; the patient is obliged to have all nourishment injected *intra anum*, and in general, soon perishes in a most emaciated condition.

Though any part of the œsophagus is liable to the kind of contractions forming strictures, the part immediately behind the cricoid cartilage, where the pharynx ends, and the œsophagus begins, is the most frequent seat of the obstruction. Those which are situated further down do not so easily admit of being examined, and relieved by any surgical operation. Strictures of the œsophagus occupy very little extent of the passage, consist of a transverse fold of the internal membrane, and are attended with little thickening of the adjacent parts. These latter circumstances are such as render the disease capable of receiving relief either from simple or armed bougies.

There are two other diseases of the œsophagus, which have symptoms similar to those of strictures. One is a thickening of the coats of the œsophagus, which extends to the surrounding parts, and generally ends in a cancer, or in incurable disease. The other affection is an ulcer of the lining of the passage, commonly situated a little below the seat of the stricture, on the back part of the tube. In the early state, these diseases can only be distinguished from a stricture, by an examination with a bougie; afterward their nature becomes clear enough from other symptoms which arise. Strictures also take place more commonly in young subjects; the other two diseases in the more advanced periods of life.

Sir E. Home has found, that a bougie can be more easily introduced into the œsophagus, when the tongue is brought forwards out of the mouth. This gentleman remarks, that when a bougie is passed, with a view of learning the nature of the case, if it passes down to the distance of eight inches, measuring from the cutting edge of the front teeth in the upper jaw, its extremity has gone beyond the usual seat of stricture. If it be withdrawn without any resistance, the aperture in the œsophagus must then be larger than the bougie employed. But if the bougie stops at the distance of six inches and a half, or even lower, it must be retained there with a uniform pressure for half a minute, so as to receive on its point an impression of the surface by which it was opposed. If the end of the bougie retains its natural form, or nearly so, and there is an indentation on one side of it, or all round it, the surgeon may conclude there is a stricture. On the other hand, should the bougie descend without impediment, as far as seven inches and a half, and, when withdrawn, the surface of its point appear irregular, and jagged, the disease is an ulcer on the posterior part of the œsophagus.

The mode of treatment, adopted by Sir E. Home, consists either in passing a common bougie occasionally through the stricture, and employing one of a larger size, in proportion as the dilatation of the obstruction is effected; or else in introducing an armed bougie at convenient intervals. The views, which I take of the disease, would lead me to prefer giving a full and fair trial to the employment of elastic gum-catheters. Consult *Practical Observations on the Treatment of Strictures in the Urethra and Œsophagus,* 3 *Vols. Edit.* 3, 1805. *Vol.* 2, 1803, *and Vol.* 3, 1821, *by Sir E. Home, Ph. H. Beuttel de Struma Œsophagi; hujusque coalitu difficili ac abolitæ deglutitionis Causis:* (*in Haller's Disp. Chir.* 2, 395,) *Tubing.* 1742, *Mauchart de Struma Œsophagi, Tubing.* 1742. *J. Warner, Cases in Surgery, p.* 130, *Ed.* 4 *F. A. J. Zinckernagel, de Clysterum Nutrientum Antiquitate, et Usu,* (*Trilleri Opusc.* 1, 399.) *A. Vater, et F. A. Zinckernagel de Deglutitionis difficilis et impeditæ causis abditis:* (*Halleri Disp. ad Morb.* 1, 577.) *E. F. Bulisius de Fame lethali ex callosa oris ventriculi angustia. J. M. Eccardus, de his qui diu vivunt sine alimento,* 4*to. Kiliæ Holsat.* 1711. *Boyer Traité de Mal. Chir. T* 7, 8*vo. Paris,* 1821.

OLEUM CAMPHORATUM. ℞. Olei olivæ. ℔j. Camphoræ ℥iv. Misce ut solvatur camphora. Sometimes employed for promoting the suppuration of indolent, particularly scrofulous swellings, which are to be rubbed with it once, twice, or thrice a day according to circumstances.

OLEUM LINI. In surgery, linseed oil is sometimes used as an application to burns, either alone, or mixed with an equal quantity of the liquor calcis. It has also been applied to cancerous ulcers.

OLEUM ORIGANI. The oil of marjoram is often used for dispersing ganglions: the tumours are to be rubbed with it two or three times a day.

OLEUM PALMÆ CAMPHORATUM. ℞. Camphoræ ʒij. Olei palmæ ℔j. The camphor is to be reduced to powder, and the palm oil, being melted, and suffered to become almost cold, is to be mixed with it in a mortar. This application is a mild topical stimulant; and has been used for promoting indolent suppurations, especially those of a scrofulous nature, which take place under the jaw, and are attended with a good deal of chronic induration.

OLEUM RICINI. In surgical cases, requiring the bowels to be opened with the slightest degree of irritation possible, the oleum ricini is the best and safest medicine. The usual dose is one large table-spoonful, which must be repeated every two or three hours, till the desired effect is produced.

OLEUM TEREBINTHINÆ. Oil of turpentine is employed externally as a stimulating liniment and a styptic. In the article *Liniment* may be seen some formulæ, in which turpentine is the most active ingredient. It is sometimes exhibited internally, for the cure of gleets.

OLEUM TEREBINTHINATUM. ℞. Olei amygdalæ ℥ss. Olei terebinthinæ gutt. xl. Misce.

In deafness, occasioned by defective, or diseased action of the glandulæ ceruminеæ, Mr. Maule directs a little of this oil to be dropped into the patient's ear, or applied at the end of a small dossil of cotton.

When a thin secretion takes place, the

cure is also promoted by a small blister, which is placed as near the ear as convenient, and kept open with the savine cerate. The meatus auditorius externus must also be cleansed every day with a lengthened bit of soft cotton, affixed to a probe. (See *Pharmacop. Chirurgica.*)

OMPHALOCE'LE. (from ομφαλος, the navel, and κηλη, a rupture.) A rupture, or hernia at the navel. (See *Hernia.*)

ONYCHIA. (ονυξ, the nail.) An abscess near the nail of the finger. (See *Whitlow.*)

O'NYX. (from ονυξ, the nail.) A small collection of matter, situated in the anterior chamber of the aqueous humour, and so named from its being shaped like a nail. It is of the same nature as *Hypopium*, to which word I must refer the reader. Maître-Jean, Mauchart, and several other oculists, imply by the term *onyx*, a small abscess between the layers of the cornea.

OPHTHALMY. (from οφθαλμος, the eye.) *Ophthalmia. Ophthalmitis.* Inflammation of the eye. This is not only a consequence of several affections of the eye, and adjacent parts, on the existence of which other disorders its continuance entirely depends, but is frequently the primary complaint, and too often the forerunner of such irreparable mischief as for ever bereaves the patient of vision. The determination of a preternatural quantity of blood into the organ, and fulness of its vessels, or a congestion, as several writers express themselves, is, according to Beer, the earliest change which occurs in ophthalmy in general. The next symptom is said to be redness, which becomes more intense, as the disorder makes progress, and if the complaint be protracted, the red assumes a dark hue, then a brownish, and lastly a bluish tinge. However, when the arteries and veins affected soon return to their natural state, the redness of the textures of the eye may not attain the greatest intensity. Professor Beer seems to adopt similar views of the nature of the process of inflammation to those which are taken by Dr. W. Philip, and some other writers already mentioned, (see *Inflammation,*) for, in consequence of the small arteries and veins being deprived of their propelling power, he considers that the blood in the texture, which is the immediate seat of inflammation, is in a state of actual stagnation. (*Lehre von den Augenkrankheiten, B.* 1, *p.* 30.) The third general symptom of ophthalmy, described by Beer, as closely following the redness, is a tense, hard, painful swelling of the texture, directly affected. Lastly, in proportion as the pain, redness, and swelling are considerable, the more obvious is another common effect of inflammation, viz. an increase of temperature or heat. But although the disturbed intercourse between the arterial and venous systems is more obvious than the effects of inflammation in other parts of the organization of the eye, yet, that the secreting and excreting vessels, and the absorbents, are also affected, is evinced by the augmented secretion and excretion in the early stage of the disorder, followed, when the inflammation has become more intense, by a suppression of these functions, and a dryness and want of pliancy in the inflamed textures of the eye. The disturbance of the connexion between the nerves and muscles also produces first various involuntary movements, which, as the inflammation makes progress, become more and more limited, and, at length, there is a complete loss of action in the textures of the eye, which are the seat of inflammation.

But, inasmuch as every disease of the eye presents some differences, depending upon the nature of the disorder itself, and others arising from the peculiar organization of the texture, which happens to be principally affected, the characteristic appearances of ophthalmy must be subject to a vast number of modifications, according as this or that structure of the eye is inflamed; and hence, sometimes one symptom of inflammation, sometimes another, chiefly predominates, while others are less conspicuous, and often scarcely distinguishable. Yet, says Beer, none of the characteristic marks of inflammation are ever entirely absent. This author represents the degree of pain as being proportioned in a great measure to the tough unyielding nature of the parts immediately around the inflamed texture of the eye, to the firm nature of the inflamed texture itself, and to the quantity of nerves with which such texture, and the parts in its immediate vicinity, are supplied. In proof of the truth of this doctrine, he instances whitlows and internal ophthalmy, where the pain is very severe; while inflammations of the conjunctiva, not extending to the deeper textures of the eye, are described as cases in which the pain is slight, because the structure affected is loose and yielding. But, without scrutinizing every reason assigned by Beer, for the varieties observable in the symptoms according to the texture which happens to be most affected, I shall briefly state a few other examples quoted by the same author. That the degree of redness, as well as of pain, varies considerably in different states of ophthalmy, is a fact universally known. In the beginning of the complaint, such redness is generally less perceptible than when the inflammation has attained its highest pitch; but it is not equally great in every individual, nor in every species of ophthalmy, being sometimes more intense and diffused, sometimes less both in degree and extent. This diversity is referred by Beer, and probably with reason, to the texture affected in the eye, being furnished with many considerable blood-vessels, obvious to the sight, or only containing vessels, more concealed and rather filled with a colourless fluid than with red blood. The looseness or unyielding nature of the texture is also represented as making a difference in the degree of redness. In inflammation, principally affecting the conjunctiva and sclerotica, says Beer, the redness is so intense, as to give the eye a frightful appearance, as is seen in chemosis; while in inflammations of the innermost textures of the organ, the redness is scarcely perceptible, and, in the erysipelatous inflammation of the eyelids, the redness is very faint. (*Beer, Lehre von den Augenkrankheiten, B.* 1, *p.* 34—36.)

Dr. Vetch remarks, that the conjunctiva is capable of being stretched to a great extent, owing to the loose structure of the cellular membrane on which it lies. and consequently little resistance is made to the enlargement of its vessels. From slight irritation, they soon become distended with red blood, "but their tone or power of reaction is speedily exhausted, and, if the exciting cause is not kept up in an increasing ratio, they quickly fall into a chronic or varicose enlargement, or again contract to the diameter of the serous vessels." On the other hand, (as the same experienced writer has pointed out,) inflammation of the sclerotic coat is slow in its commencement, and often insidious in its progress, even when its ultimate violence is great. *In the early stage of conjunctival ophthalmia, the inflammation is most observable at a distance from the cornea,* round which the membrane often preserves for a length of time its natural appearance. Precisely *the reverse takes place in the case of sclerotic inflammation, which invariably appears at the circumference of the cornea, forming a zone, more or less complete around it, and most conspicuous above it,* the form and colour of the vessels being at the same time wholly different from those which appear in the course of conjunctival inflammation. *Intolerance of light* (says Dr. Vetch,) *invariably accompanies sclerotic inflammation,* and is entirely unconnected with that of the conjunctiva. (*A Practical Treatise on the Diseases of the Eye*, p. 10.) If the latter observation be strictly correct, it is to be inferred that, in all common cases of acute ophthalmy, involving the conjunctiva on the front of the eyeball, the sclerotica is more or less affected, as in the beginning of the disorder, light may be said to be seriously annoying to every patient.

According to Mr. Travers, when the sclerotica partakes of the inflammation of the conjunctiva, the vessels which pursue a straight course to the margin of the cornea, are strongly distinguished, and have a somewhat darker hue, than the areolar vessels upon the loose portion of the conjunctiva. (*Synopsis of the Diseases of the Eye*, p. 128.)

Diversified as the pain, redness, swelling, and heat, the four characteristic symptoms of inflammation, may be in cases of ophthalmy, the incidental appearances in the eye are not less subject to numerous modifications. Thus, sometimes an extraordinary involuntary action of the muscles of the eyeball and eyelids, or of the secreting and excreting lachrymal organs, and of the Meibomian glands may be noticed; and sometimes the action of all these parts is either diminished, or completely stopped. These differences Beer refers to the latter parts being either themselves inflamed, or sympathizing with the inflamed texture of the eye. In the first case, the action of the muscles, and the functions of the lachrymal organs, and Meibomian glands, are more and more interrupted in proportion as the inflammation increases, and must thus remain, while the inflammation lasts in its genuine form; but, in the second case, they go on, and this even with greater activity, while the inflammation continues, and until it has ceased to become more violent. (*B.* 1. *p.* 39.)

Acute ophthalmy in general, when at all severe, and particularly when the inner textures of the eye are affected, produces a febrile disturbance of the whole constitution. This change from a local to a general indisposition takes place with greater certainty and quickness, in proportion as the focus of inflammation is extensive, the constitution irritable, the disorder of the eye neglected, and the mischief considerable, which is actually produced in the organ, whether accidentally, or in consequence of unskilful treatment. (*Beer. Vol. cit. p.* 42.)

Many of the appearances and effects of ophthalmy are different, as the inflammation happens to be of an acute, or chronic nature. And, as Scarpa has taken particular pains to impress upon the minds of surgical practitioners, every acute ophthalmy though treated in the best possible manner, is never so completely resolved as not to be followed by a certain period, at which all active disturbance ceases, in the place of which a degree of chronic ophthalmy remains in the conjunctiva, or lining of the eyelids; the effect either of local weakness in the vessels, or of the continuance of a morbid irritability in the eye, after the removal of the acute stage of the inflammation. As it occasions a diseased secretion in the organ, and a slow accumulation of blood and coagulating lymph, the inexperienced are apt to suppose, that the acute stage is not yet entirely subdued, while it is completely so. Now, if the inculcations of Richter and Scarpa be correct, immediately the critical moment arrives, when the acute stage changes into the chronic, attended with local weakness, it is of the highest importance to alter the treatment without delay, and to substitute for emollient relaxing applications, such as partake of an astringent corroborant quality, as the former only protract the turgescence of the vessels, and the redness of the conjunctiva. "Quo major autem fuit inflammationis vehementia (says Richter,) eo major plerumque sequitur partium affectarum atonia. eoque major opus est adstringentium et roborantium longo usu, ut auferantur penitus reliquiæ morbi, &c." (*F sical. Obs. Chir.* 1, *p* 109.)

It is on the accession of the second stage of ophthalmy, that one may remark the sudden increase of redness in the inflamed texture, with a brown and afterward a blue tinge; actual extravasations of blood in the chambers of the aqueous humour; ecchymosis of the conjunctiva; a considerable increase of swelling; the decline and irregularity of the pain; the decrease of the inflammatory heat and throbbing; a sensation of cold and heaviness in the organ; and more or less œdematous swelling of the surrounding parts. It is also in the second stage, that suppuration is liable to happen. (*Beer, Lehre, &c. B.* 1, *p.* 46.) And in another page the same author observes, that the characteristic signs of the second stage of ophthalmy consist in the following appearances: while the redness and swelling undergo a sudden and striking increase, the hardness manifestly diminishes, and the pain becomes very unequal, and not continual; the secretions and excretions also, which, during the first stage, were completely stopped, commence again, but more copiously, and are of a very different quality from what they were in the state of health. The disorder is now quite in its second stage, and this is the time when purulent matter may begin to be formed. (*B.* 1, *p.* 50.) According to Beer, the duration of idiopathic ophthalmy depends upon the circumstances of each individual case; first, the nature of the causes giving rise to the affection; secondly, the irritability of the patient in relation to constitution, sex and age; thirdly, what may be termed the constitution of the affected eye itself, and the texture in it immediately inflamed. Thus ophthalmy is likely to be attended with great severity, when it attacks plethoric individuals, in whom there has been for some time previously a great determination of blood to the head and eyes, or whose sight has been strained by looking at shining objects, or constitutions hurt by good living and hard drinking. Every severe ophthalmy runs through its first stage much more rapidly in weak, irritable subjects and children, than in robust individuals. It is also another remark made by Beer, that every inflammation of the eye, at all considerable, is generally of shorter continuance in gray or blue-eyed, than in dark, or black-eyed persons; and in the same manner, inflammation of the internal, sensible, and tender textures of the eyeball always passes through its first stage more quickly, than inflammation of the eyelids.

With respect to the *causes of ophthalmy in general*, as the disorder frequently affects the innermost parts of the eye, and when severe, is attended with some risk of the loss of the organ, the annihilation of its functions, or the spoiling of some of its textures; and also, as inflammation is the most frequent complaint to which the eye is subject, it is important to learn, as far as possible, the causes, which either directly or indirectly give rise to it.

The atmospheric air and light have a direct and powerful operation upon the eyes; and in order that the former may have no hurtful effect upon these organs, it should be pure, that is to say, its regular component parts should not be altered, nor blended with extraneous substances. The temperature of the air is likewise described by Beer, as making a good deal of difference in the susceptibility of the eyes for inflammation, either a very warm, or cold air, being, in this respect, hurtful. The observation, however, is qualified with the admission, that the terms *warm* and *cold* have only a relative signification to individual circumstances. The effect of a blast of cold air on the eye, in exciting inflammation, is universally known, and needs no comment. It is an opinion of Beer, that the eye is much affected by the quantity of electricity in the atmosphere, and he says, that on this account, no experienced practitioner would undertake the extraction of a cataract during, or on the approach of a storm. (*B.* 1, *p.* 65.)

Passing over many interesting observations made by Beer, on the contamination of the atmospheric air by the admixture of other gases, and the injurious effect of this change upon the eyes, I come to his remarks on the operation of light upon these organs. Though light, he observes, is indispensable to the functions of the eye, it becomes pernicious, when suddenly increased beyond what the organ can bear, so as to be a source of irritation. As a proof of this fact, he cites an instance, in which a young, plethoric, strong man, whose eyes had been for some time unavoidably strained by immoderate exercise of them, was suddenly attacked with a violent ophthalmy, while looking at an optical representation of the rising sun, and carried home in great agony. But with respect to the influence of light, Beer observes, that every statement is to be received only in a relative sense; for the degree of light which would answer very well for the eye of an African, would destroy many European eyes; and the same light, which is borne without inconvenience by the eye of an adult, would excite in the eye of a new-born infant the *ophthalmia neonatorum*, by which so many children are deprived of the most valuable of the senses in the first days of their existence. Beer further explains, that the same degree of light produces a stronger, or weaker effect, according to the greater or lesser irritability of the eye of the same person at different times, as we see exemplified in every individual in the tenderness of his eye to light when he first awakes in the morning. Light is also not hurtful to the eyes, merely according to its quantity; for the direction of the rays makes a great deal of difference, the eye being less capable of bearing them with impunity the more they recede from a perpendicular line, and strike the organ slopingly, or horizontally. Much likewise depends upon the kind of light; that which is reflected from a scarlet surface, being even more prejudicial than the sunshine which is reflected from a country covered with snow; another convincing proof, that the bad effects are not always in proportion to the quantity of rays. The light of burning-glasses, concave mirrors, white screens, the full moon, &c. and the shining of diamonds, are well known to render the eyes weak, and prone to inflammation. Among other occasional causes of ophthalmy, Beer enumerates the custom of washing the eyes immoderately with cold water, a remark in which I do not place much confidence myself; the application of various stimulating medicated substances to them; compresses and bandages; the badness of instruments employed in operations upon the eyes; the employment of spectacles unnecessarily, or of such as are not adapted to the eyes of the individual; and every immoderate exertion of the eyesight.

But, among the most important and frequent exciting causes of ophthalmy, are extraneous bodies, which insinuate themselves between the eyeball and eyelids, and every kind of wound or injury of the eye.

Foreign bodies, liable to enter under the eyelids, are of three kinds; first, they may either be such as are in themselves completely innoxious to the eye; or such as are likely to hurt the eye only when strongly pressed upon by the spasmodic closure of the eyelids, or by the patient's imprudently rubbing the eye; or they may be of a quality which injures the eye the moment they come into contact with it. Foreign bodies of the first description lie loose under one of the eyelids, and, for the most part, either immediately behind its edge in the groove destined for the conveyance of the tears, or else in the fold, seen when the eyelid is everted, exactly at the line where the palpebra and sclerotic conjunctiva join together. They never actually lodge in the coats of the eye; but they irritate it either mechanically or chymically, or in both ways together, according to their size, shape, and chymical properties.

In the list of such extraneous substances are inverted eyelashes; particles of dust; snuff; pepper; minute insects; and other small things generally carried under the eyelids by the wind.

As these foreign bodies are all of them more or less irritating to the eye, they must be considered as a principal exciting cause of ophthalmy, which frequently follows their entrance under the eyelids with extraordinary rapidity. However, the redness and effusion of tears, sometimes instantly following the insinuation of extraneous substances under the palpebræ, and as suddenly ceasing on their removal, Beer considers rather as preliminaries to inflammation, than as this disorder itself. (*B.* 1, *p.* 92.)

Wounds and other injuries of the eye, regarded as causes of ophthalmy, Beer divides into three kinds; viz. *mechanical*, *chymical*, and *mixed*. A prick of the eye with a fine needle is an example of a simple mechanical injury; the action of quicklime upon the organ is an instance of one purely chymical; and the violent propulsion of a red-hot bit of iron against the eye is a lesion, which may be said to be both mechanical and chymical. The same author makes a variety of original reflections upon the differences connected with the extent and intensity of such injuries. Their intensity, he views only as something relative; thus, either the force, with which the eye is injured, is of itself too great ever to be resisted, as is seen in a gunshot wound; or the organic powers of the patient are, from age, sex, or constitution, much too feeble for the eye to bear favourably any considerable injury, as is the case with children and weak unhealthy females; or the organization of the eye itself may be weak, and the effects of the violence therefore greater, as exemplified in the fact of a brown or black eye generally bearing a wound better than a gray or blue one; or, lastly, the organic powers of the texture of the eye, immediately injured, may be too feeble to bear even a slight lesion, as is the case with the retina. (*B.* 1, *p.* 95.)

Mechanical injuries of the eye may be made either with sharp or obtuse bodies. Sharp-pointed and cutting instruments are capable of readily penetrating the eye, without occasioning at the moment of their entrance, any violent compression, or laceration of the neighbouring textures; and consequently the injury inflicted is a simple puncture, or an incision. Sabre-cuts of the eye, however, are to be excepted; for, though the weapon may be sharp, the blow is always attended with more or less concussion, and injury of the textures, adjoining the wound, which are very delicate and readily spoiled. Blunt weapons, or bodies, can only enter the texture of the eye by dint of great force, and, in this case, always cause a serious degree of compression, stretching, and laceration; but sometimes when they do not penetrate the organ, the contusion is such as is productive of not less mischief.

In the case of a simple puncture or incision of the eye, Beer seems to think that the subsequent ophthalmy is generally more owing to the incapacity of the wounded organ to bear the effects of the light, air, &c. than to the injury itself abstractedly considered. He observes, that a proof of the truth of this opinion is seen in the extraction of the cataract; for, if the operator is careless in the operation itself, opening the flap of the cornea very wide, so as to let the atmospheric air have free access to the inner textures of the eye; or if after the operation is finished, he do not apply the dressings with caution, and properly darken the patient's chamber, he is letting the eye be subjected to some of the most active causes of inflammation. But though Beer is unquestionably correct, in regard to the injurious effects of light on the wounded eye, it may be doubted, whether his theories do not make him attribute too much to the irritation of the air, and too little to that of the mechanical division of the parts.

Passing over many of Beer's observations on injuries of the eye produced by blunt bodies, and substances acting chymically upon it, I leave the topic of the direct exciting causes of ophthalmy, and come to the consideration of those which he regards as *indirect*. And the first to which he adverts, is every thing that has a tendency to keep up a determination of a large quantity of blood into the small vessels of the head and eyes. Immoderate bodily exercise; violent emotions of the mind; injudicious clothing; and high living, are afterward enumerated as having an indirect effect in the production of ophthalmy; but it does not appear to me, that Beer's sentiments upon these points are entitled to much attention. With respect to *infection* and *contagion*, as causes of inflammation of the eye, Beer understands by *infection*, what at first takes effect only upon a small point of the body, but never the whole animal economy directly, that is to say, before absorption has taken place. Hence, says he, infectious diseases are very seldom the cause of ophthalmy, unless some of their matter be applied immediately to the eye itself; but he admits that they often dispose this organ to inflame from slight causes, by the impairment which they produce of the general health. On the other hand, he considers all *contagions* as very quickly affecting the whole of the constitution directly through the medium of the skin, or the trachea, lungs, œsophagus, &c. Hence, contagion is set down as being much more frequently, than infection, the indirect cause of ophthalmy. Beer conceives, however, that as the contagious principle is blended with the atmosphere, it may also have an immediate operation upon the eyes, and thus he attempts to account for the organs not unfrequently exhibiting a tendency to inflammation at the very moment of the contagion taking effect. (*B.* 1, *p.* 121.) But this is a difficult and obscure subject, which can be viewed to more advantage when particular kinds of ophthalmy are considered.

In Beer's general observations on the treatment of inflammations of the eyes, the first indication specified, is *to remove immediately every thing, which is obviously producing an irritating effect upon the eye, and to take care that no fresh source of irritation to the organ incidentally take place.* And, as it frequently happens, even in healthy, strong individuals, that ophthalmy is occasioned by foreign bodies, either lodged under the eyelids, or inserted in some part of the eyeball, and not suspected to be there, the earliest attention should always be paid to their gentle and skilful removal. Easy as this object is of accomplishment, when not delayed, when the eye has not been seriously irritated by friction and pressure, and the patient is not of a weak, irritable constitution, it is often attended with great difficulty under one, or the other of these circumstances, especially the last. In this case, strong convulsive rotations of the eyeball, followed by a violent and obstinate spasmodic closure of the eyelids, render it impossible to separate them; and the spasm is the stronger and more lasting, the more the extraneous substances are calculated by their shape and chymical quality, to irritate the eye; and the greater the irritability of the patient is. In this state of things, every attempt forcibly to open the eye, or to examine it in the light, is not only useless, but increases and keeps up the spasm, which nothing will lessen and shorten, except darkness and perfect repose. But, as timid irritable persons are exceedingly apprehensive of the consequences of the lodgment of extraneous substances in the eye, the surgeon should endeavour to lessen their inquietude, by assuring them that every thing will be right again, which is strictly true when the foreign bodies are of the first class. Then the spasmodic closure of the eyelids will cease, and the extraneous substance admit of being properly taken away.

Success, however, does not always attend this simple method; for, in very weak subjects, the spasm of the orbicularis palpebrarum is so violent and obstinate, especially when a foreign body lodges in the eye, and at the same time mechanically and chymically irritates it, (as is the case with particles of snuff,) that it becomes indispensable to have recourse to medicinal applications. For this purpose, Beer's experience has convinced him, that the best thing is a bread poultice, made either with milk or water, and containing some of the vinous tincture of opium. Care is to be taken, however, never to let it become quite cold, during its application; for then the spasm would only be aggravated by it; and, if such spasm has been of long continuance, when the surgeon is first sent for, the poultice, according to Beer, may be rendered more efficacious by the addition of hyosciamus to it. In very irritable hysterical and hypochondriacal persons, such local treatment alone is frequently insufficient, and recourse must be had to the internal exhibition of antispasmodic anodyne medicines. At length, when the spasm of the orbicular muscle is so far diminished, that the eyelids can be effectually opened without any force for the extraction of the foreign body, great caution and gentleness will yet be necessary, and, in particular, the eye should be kept in a very moderate light, as the spasm would be immediately excited again, either by sudden exposure of the eye to too much light, or rough handling of the eyelids.

Sometimes, a person rubs his eye at first awaking in the morning, and if the eyelashes are very numerous and rigid, one of them will lodge between the eyeball and lower eyelid; it may readily be taken away with the end of a fine moist sponge, or camel-hair pencil, the eyelid being depressed as much as possible and the eye itself turned upward, so that the hair may not be concealed in the fold of the conjunctiva. When the hair is situated under the upper eyelid (which Beer says rarely happens) it always lodges in the fold of the preceding membrane, whence it may be extracted in the manner above directed, with the difference that the eyelid must be raised or everted, and the eye rotated downwards. (*Lehre von den Krankh. B.* 1, *p.* 128, 130.)

For directions respecting the treatment of redundant and inverted ciliæ, see *Distichiasis* and *Trichiasis.*

Small globular smooth extraneous bodies, lodged under the eyelids, are very easily extracted, when the eyelid is gently taken hold of both by its edge and the eyelashes, and lifted up from the eye, while the patient inclines his head forwards, and the eye is turned completely downwards: the effusion of tears, excited by these manœuvres, will now generally wash these extraneous substances out of the eye, as they are not at all fixed. When the fissure between the eyelids is wide and open, but the eyeball at the same time very prominent, the object may also be easily accomplished, when the upper eyelid is gently and repeatedly stroked with the finger from the outer towards the inner canthus; in which case, the round smooth foreign body soon makes its appearance above the caruncula lachrymalis, whence it falls out of itself, or may be taken with the corner of a pocket handkerchief. The worst cases are those, in which the eyes are very prominent, and the fissure of the eyelids small, as all the above methods are then useless, and only productive of irritation. In this circumstance, therefore, Beer recommends the surgeon to take hold of the eyelid by the ciliæ, and its edge with the thumb and forefinger, and separate it from the eyeball, which is to be turned downwards, while, with Daviel's small scoop, or the head of any large curved needle, introduced straight under the eyelid, at the outer canthus, as high as possible, the extraneous substance is to be extracted with a semicircular movement, directed towards the nose. Though this method will almost always succeed, Beer confesses, that it is not without the production of a great deal of mechanical irritation.

In consequence of the detention of such substances under the eyelids, the conjunctiva sometimes becomes thickened; this change, when slight, soon disappears of itself after the removal of the foreign bodies; but, in other cases, Beer recommends the diseased part of the membrane to be removed with a pair of scissors; and, after the bleeding has ceased, the frequent application of the lotio plumbi acetatis to the eye.

Particles of common dust, and of the sand and powders, frequently thrown over letters, and very apt to get into the eyes of persons who open their letters carelessly, or from short-sightedness, are obliged to bring them close to the nose, are generally more difficult of extraction. In the attempt, however, the eye must never be subjected to too much irritation. According to Beer, these extraneous particles of dust, or sand, may sometimes be removed by washing the eye well, or by dropping into it milk, or some other viscid fluid, while the patient lies upon his back, and the eyelid is lifted up from the eye. But, the most expeditious and certain plan is to employ a syringe, the pipe of which is to be introduced under the upper eyelid near the outer canthus, and the fluid thrown briskly in the direction towards the nose. If all the extraneous matter cannot be thus removed, the rest may sometimes be taken out with a camel-hair pencil, dipped in some viscid fluid, or fresh butter, and the eye is then to be washed again.

When particles of sugar, or other soluble, not very irritating substances, happen to insinuate themselves into the eye, professional aid is seldom required, as they generally dissolve in the tears, and are voided before a surgeon can arrive. Snuff, pepper, and other minute irritating bodies, as well as small winged insects, are to be removed in the same manner, as particles of dust and letter-sand; but, particular care is to be taken afterward to wash the eye well with some lukewarm mucilaginous collyrium, until the irritation, caused by the chymical effect of such foreign bodies, has been completely obviated.

The removal of foreign bodies of the second class is usually attended with more difficulty, because they, as well as those of the third class, more frequently produce a violent and obstinate spasmodic closure of the eyelids, and are seldom loose, being generally fixed in the cornea. However, when they happen to be detached, they may be extracted in the same way, as small round smooth extraneous bodies, except that the stroking of the eyelid with the finger should be omitted, not only as useless, but likely to press any of these substances, which are of a pointed shape, into the loose conjunctiva, so as to injure the eye itself, which would otherwise not be hurt. The nibs of pens, the parings of the nails, and small hard-winged insects, when lodged in a depression of the cornea, or white of the eye, Beer says, may be easily dislodged by means of a small silver spatula. Other foreign bodies of the second class are not only fixed in a depression, but even penetrate more deeply than the conjunctiva; and, in old subjects, in particular, they often insinuate themselves into the loose cellular membrane under the conjunctiva in the white of the eye, partly in consequence of the convulsive motions of the eyeball and eyelids, and partly by reason of the attempts made to loosen them. Hence, they frequently become situated a great way from the place of their entrance, and are completely covered by the conjunctiva. But, even when they lie immediately in the wound, they are so intimately connected with the subjacent loose cellular membrane of the conjunctiva, that every attempt to remove them with forceps is not only unavailing, but hurtful to the eye, inasmuch as the injury is thereby rendered deeper. They may be taken away with facility, however, when lifted up with a pair of small forceps, and are cut away with a pair of scissors, together with the piece of cellular membrane, with which they are directly connected. If such extraneous substance should be actually underneath the sclerotic conjunctiva, Beer recommends the eyelids to be well opened, and the eye to be brought into a position, in which the part of the conjunctiva covering the foreign body, is rendered tense when an incision is to be made with a lancet down to the extraneous substance, which is to be taken hold of, and removed with a pair of scissors, the assistant being careful to keep hold of the eyelids during the operation. On the other hand, when the foreign body is actually lodged between the layers of the cornea, Beer considers that its extraction may be best accomplished with a lancet-pointed couching needle. But whatever instrument is used, its point must be passed with great caution closely and obliquely under the foreign body; and care must be taken not to introduce it too deeply, lest the anterior chamber be opened, which may readily happen in young subjects; and when it does, the aqueous humour flows out, and the cornea becomes so flaccid, that the removal of the extraneous substance is quite impracticable, before the puncture has healed, and the anterior chamber is again distended.

The removal of foreign bodies of the third class mostly demands very great caution, first, because, as Beer observes, no particles of them should be allowed to remain in the eye, which, without the utmost vigilance, is apt to be the case; and secondly, because the wound of the eye, already considerable, should not be made larger than can be avoided. The extraction of small bits of glass is particularly difficult, as they cannot be seen, but must be found out entirely by the feelings of the patient, or the *tactus eruditus* of the surgeon, assisted with a probe. When in this way, a particle of glass is detected, Beer directs us to take hold of it with a pair of forceps, and cut it away with scissors. The place from which it has been removed, must then be carefully probed, in order that no other fragment may be left in it. (*Beer.*)

According to the same author, pieces of iron and steel, which strike the eye so forcibly as to enter it, as well as all other fragments of metals, which are readily oxydated, should be as carefully removed as bits of glass; for the more easily they combine with oxygen, and the longer they remain, the more brittle they become, and the more apt are minute particles to be left in the eye, especially in the cornea. A speck on the part of this membrane, where the splinter has lodged, is the least serious consequence of such an event. When fragments of steel, which have quite a black appearance, remain fixed in the cornea several hours, it is found, after their removal, that the whole circumference of the depression, from which they have been extracted, is of a reddish-brown colour, produced by the rust left behind, and firmly adhering to the cornea. Every particle of rust must be carefully removed with a couching needle, or else a permanent speck will ensue; but, caution must be used not to puncture the anterior chamber. The extraction of particles of lead and gunpowder is generally difficult, as they have mostly been projected with great force against the eyelids, so as to produce not only a great deal of spasm, but instantaneous swelling of those parts. Hence, Beer says, that they should commonly be taken hold of with forceps, and cut away. Particles of cantharides are easily removed with a small silver spatula, or the end of an eye-probe; but, their violent chymical effect must be obviated, by frequently applying to the part a little fresh butter, touching it with a camel-hair pencil, dipped in diluted liquor ammoniæ, or dropping into the eye lukewarm mucilaginous collyria.

The attempt to wash out of the eye particles of quicklime, mortar, &c. Beer says, only has the effect of rendering the violent chymical operation of these substances more diffused, and he recommends them to be taken out of the eye, by means of a fine hair pencil, dipped in fresh butter, or oil. This is the only way of immediately counteracting their chymical effect, and, after their extraction, the application of unctuous substances to the part should still be continued.

The stings of small insects, when lodged in the sclerotic conjunctiva, are often very difficult of detection; but they are more readily seen on the skin of the eyelids. Beer directs us to remove them with a pair of forceps, or a couching needle, and then to have recourse to means calculated to diminish the ophthalmy, which, in these cases, always begins on the first occurrence of the accident. Small shots, lodged in the loose cellular texture of the conjunctiva, must be cut out. In general, says Beer, it is necessary to divide the conjunctiva, as they are mostly situated some distance from the place of their entrance, and of course are quite covered by that membrane.

As soon as a foreign body has been extracted from the eye, all precursors of ophthalmy diminish, as for instance, the redness, intolerance of light, and the increased secretion and effusion of tears. Even the inflammation itself, when already developed, subsides; but, this affection is slight. if the eye has not itself been injured by the extraneous body. On the other hand, when the eye has suffered more or less irritation from the nature of the substance itself, and the treatment requisite for its complete extraction, the inflammation may become more severe, unless the surgeon pay immediate attention to the injury left on the eye. (*Beer.*)

According to the principles laid down in the foregoing columns, the first indication in the treatment of wounds of the eye in general is to remove every kind of extraneous substance, which might impede the cure. Hence, the necessity of observing whether the instrument with which the wound has been inflicted, or any part of it, is lodged in the eye. When this is the case, the foreign body should be quickly extracted, or else no recovery of the organ can take place. But, says Beer, this is more easily said than done; for in many instances, it is very difficult to find and remove the fragments of instruments, on account of the great delicacy of the organ, the irritability and alarm of the patient, and the bleeding from the part. However, the attempt must be made with the greatest gentleness possible; and Beer particularly advises a fine elastic whalebone probe to be used, instead of a silver one, for the purpose of detecting the fragment. He also sanctions making an incision, for facilitating the finding of the extraneous substance, provided it is certainly lodged, and cannot otherwise be traced. This author attaches great importance to the fulfilment of this first indication in all wounds of the eye, and relates a case, to which he was called sixteen years ago, where a piece of tobacco pipe had been driven so forcibly and deeply at the external canthus between the eyeball and orbit of a young student, aged 19, and of delicate make, that the eye was immediately pushed out of its socket, and, on Beer's arrival, it lay with the cornea quite against the nose. Its very position led Beer to suspect, that some extraneous body was lodged in the orbit, and, notwithstanding the assurances of all the bystanders to the contrary, and the patient's being affected with violent spasms, the part was examined with a fine flexible whalebone probe, by which means, a piece of the pipe, nearly an inch in length, was felt, and immediately extracted with a pair of forceps. Scarcely had this substance been removed, when the eyeball was spontaneously drawn back into the orbit, though with the cornea still turned towards the nose, and the twitchings of the muscles also instantly ceased; but the eye was blind, and had but a very faint perception of light. By very careful treatment, the eyesight was restored in five weeks; but, the eye could not turn towards the temple, owing to the considerable injury, which the external straight muscle had sustained. With the aid of electricity, the power of rotating the eye about half its natural extent outwards was in the end regained, and the remaining infirmity resisted every method, deemed worthy of trial. (*Beer, B.* 1, *p.* 146. See also the article *Exophthalmia.*)

Fragments of broken instruments are not the only kind of extraneous substances, which may lodge in the wounded eye; for, as Beer observes, when the injury is extensive, contused, and lacerated, there may be splinters of bone, or pieces of membrane, cellular substance, muscle, &c. so detached as to be quite incapable of reunion, on which account, this author sets them down as foreign bodies requiring to be taken away. However, I conceive, that, with respect to the soft parts, the advice here delivered should be received with much limitation

Wounds of the eye, like those of most other parts of the body, may be healed either by direct union, or a slower process, in which suppuration, the filling up of the chasm, by granulations, and the gradual but not complete approximation of its edges to each other, are the most conspicuous effects. Clean incised wounds may be cured in the first way, (see *Cataract*;) and lacerated, contused wounds, or such as are attended with loss of substance, in the second. But, whichever plan be attempted, the eye must be kept quiet, and excluded from the air and light, with a light suitable bandage. As in wounds and chymical injuries of the eyeball itself, not admitting of reunion, the eyelids, when closed, completely cover the wounded part, the application of dressings to it becomes both unnecessary and impracticable, and all that can be done is to drop frequently into the eye a mucilaginous collyrium, and cover the organ with a light bandage, which will not make any hurtful pressure. In simple contusions of the eye, unaccompanied with wound, Beer deems a bandage the only requisite application; but, when these accidents are conjoined with effusion of blood, he recommends the use of spirituous aromatic fomentations, with the view of promoting absorption.

In healthy individuals small punctures of the eye, made with instruments like needles, and perforating only the conjunctiva, or cornea, but not reaching the deeper textures of the organ, are generally followed by no serious consequences, even when all the aqueous humour is voided. It is only necessary to keep the eye quiet, and the air and light excluded from it by means of a light compress, suspended over it from the forehead. Under this treatment, such punctures are so firmly closed in twenty-four hours, without any opacity, that the chambers are nearly filled again with aqueous humour, and the intolerance of light, which was only the effect of the loss of that fluid, is entirely removed.

In large clean cut wounds of the eye, whether accidental or made in the extraction of the cataract, the prognosis must be very cautious, and the treatment conducted with the utmost care; for, says Beer, it too readily happens, that, though the wound is not important in itself, its effects become from the least mismanagement highly dangerous to the eye. Hence, when the patient is known to be either an individual not likely to take proper care of himself, or one too much alarmed about the fate of his eye, the prognosis should be very guarded, even where the consitution is of the best description, because a violent and dangerous attack of ophthalmy is apt to ensue, and destroy the eye, sooner than effectual succour can be administered. On the other hand, when the patient is steady and intelligent, and the case is properly treated, the prognosis is very favourable.

In considerable cuts of the eye, it is only possible to promote their union with a suitable bandage, and by effectually preventing all motion of the eye and eyelids, which is best accomplished, when the sound as well as the injured eye is covered, and the patient kept quiet in bed until the sides of the wound have grown together. (*Beer, B.* 1, *p.* 164.)

As cases of deeply penetrating wounds of the eyeball itself, Beer enumerates the punctures made in the depression and reclination of the cataract, and in every mode of forming artificial pupil; and lacerations of the conjunctiva with ears of corn, pointed pieces of iron, splinters of wood, &c. In these cases, the prognosis, he says, is always very favourable, when the patient can put himself under all the conditions which the treatment requires, and his constitution is good. The first thing here to be carefully fulfilled, is the removal of any fragments of the instrument, or body, with which the injury has been inflicted, and it should be recollected, that, in these cases, minute splinters, which are scarcely discernible, frequently lodge in the conjunctiva, and, if not immediately traced and removed, produce the very worst consequences. By the weapon being suddenly withdrawn, pieces of the conjunctiva are sometimes nearly torn away, and hang from the eye; these Beer directs to be cut off with scissors. The best applications, he says, are either lukewarm mucilaginous lotions, or, (when blood is effused under the conjunctiva,) vinous, spirituous collyria. To these cases, he thinks fomentations scarcely applicable. When the quantity of blood, effused in the loose cellular texture under the conjunctiva, is very considerable, he recommends scarifications, but, where this practice does seem likely to answer, and vinous spirituous collyria are ineffectual, some of the liquor ammoniæ should be added to them. When any fragment of the instrument has been overlooked, and remains in the part, either a copious suppuration ensues, and the fragment is at length detached, or else, in a patient of inferior sensibility, a soft, spongy, readily bleeding, pale-red excrescence is formed all round the extraneous body, and sometimes even projects between the eyelids. Here, according to Beer, the first requisite step is to cut away the fungus with a knife, so as to reach the irritating fragment under it, and then the rest of the excrescence may be removed by touching it with the tinctura thebaica, or vinous tincture of opium.

With respect to lacerated wounds of the cornea, they either penetrate the anterior chamber, or not. They are all of them attended with more or less concussion, laceration, stretching, and partial contusion of the delicate anterior textures of the eyeball; a consideration, as Beer observes, materially affecting the prognosis. When, in such injuries of the cornea, inflammation and suppuration cannot be prevented, or the discharge is protracted, an obvious scar is always the consequence, which, when situated in the centre of the cornea, is a serious impediment to vision. Every endeavour should therefore be made to unite the wound by the first intention; and the best chance will be afforded by treating the eye precisely in the same manner as after the extraction of the cataract. (See *Cataract.*) And, when fortunately the plan succeeds, the flow of the aqueous humour out of the eye ceases in about 36 or 48 hours, and the anterior chamber becomes distended again; but, the site of the injury continues visible for some time afterward. The speck, however, ultimately disappears, though much sooner in young healthy subjects, than in the aged and feeble. When the opacity does not go off of itself, Beer finds a collyrium, containing some of the lapis divinus, (see *Lachrymal Organs,*) and the vinous tincture of opium, the most effectual means of dispersing it. Through large wounds, penetrating the cornea near its edge, a fold of the iris is apt to protrude, and, when it does, it should be replaced, which can only be effected without mischief to the eye by gently rubbing the upper eyelid, and then letting a strong light suddenly strike the organ. In this case, the employment of instruments is considered by Beer highly objectionable. When the iris is not immediately reduced, it as well as the cornea is attacked with inflammation, and soon becomes firmly adherent to the edges of the wound. (See *Iris, Prolapsus of the.*)

Large wounds penetrating the eyeball, and reaching to the iris, are always of a very serious nature, even though the latter part may have received only a prick, or cut, because as the injury has been produced by accident, and not by art, the wound of the iris cannot be free from all laceration and contusion. It is incredible, says Beer, what extensive injuries the iris will bear in healthy individuals at its pupillary and ciliary edges, especially when produced by very sharp instruments; nay, rents may happen at both its edges, without any ill consequences, if the constitution be favourable; a proof of which fact is seen in the two common methods of forming an artificial pupil, viz. the excision of a piece of the iris, and the detachment of the iris from the ciliary ligament, as practised both by Schmidt and Scarpa. But, according to Beer, all violent pressure, or actual contusion, particularly when it affects the portion of this organ between its two circles, cannot be borne even in the best constitutions, and the least grievous consequence is inflammation, soon followed by a partial or complete closure of the pupil, or suppuration in the eyeball. When the instrument, causing such injury, passes to the iris through the cornea, as is mostly the case, and the wound in the latter tunic is extensive, the torn iris is frequently pulled between the edges of the wound, at the moment when the weapon is withdrawn, and protrudes in a lacerated state. In this case, Beer recommends the torn projecting piece of the iris to be cut away with scissors close to the wound in the cornea, when the rest, he says, is generally retracted within the eye. Thus an adhesion of the iris to the cornea, termed *synechia anterior*, may often be prevented, which, when the lacerated iris is suffered to hang out of the cornea, is inevitable, surrounded by a large opaque cicatrix.

Some violent blows on the eye, though they cause no wound, are attended with such a concussion of the anterior hemisphere of the organ, that more or less of the iris is instantaneously separated from the part of the ciliary ligament, where the force is most vehement. The consequence of this accident is either a double pupil, or the natural pupil closes, and the artificial one remains open. Such injuries may be produced by the lash of a whip, or a horse's tail, (a common accident in the narrow streets of Vienna) or the thrust of any bluntish weapon against the outer part of the cornea; and they are purposely inflicted in the method of forming an artificial pupil, recommended both by Schmidt and Scarpa.

Wounds which enter the eye through the sclerotica near the cornea, usually produce a considerable effusion of blood in the chambers of the aqueous humour; but Beer thinks that there is never any necessity for making an opening for its discharge at the lower part of the cornea, except when it is so considerable as completely to hide the iris, at the same time that the eyeball is affected with very painful tension and hardness. In all wounds of the iris, it is likewise proper to follow the same treatment as applies to penetrating wounds of the cornea, with this difference, that when the effusion of blood in the chambers of the eye is considerable, the action of the absorbents should be promoted by the immediate employment of vinous aromatic collyria, and afterward warm spirituous lotions.

Wounds of the eyeball, affecting the corpus ciliare, are set down by Beer as extremely dangerous, independently of the inflammation, which quickly follows. However, such injuries are most serious when they consist in a real contusion, or laceration of the corpus ciliare, which can hardly take place without a severe concussion, or actual disorganization of the retina, and laceration of the principal ciliary nerves and vessels. Hence, besides an effusion of blood in the chambers of the aqueous humour, a partial or complete amaurotic blindness is instantly produced, and the iris, in the vicinity of the place where the instrument entered, is so retracted towards the margin of the cornea, that neither of its circles can be seen. In cases of this description it also frequently happens, says Beer, that the patient, or the person who inflicted the wound, suddenly and roughly pulls the weapon out of the eye again, and together with it a part of the corpus ciliare, which is then to be regarded as an extraneous substance, and immediately cut off. With respect to the prognosis and treatment, the observations already made on these topics, in reference to wounds of the iris, are here quite applicable, excepting that as the effused blood is less copious than in the latter cases, there can never be here any necessity for letting it out by a depending opening in the cornea.

Wounds of the eye, affecting the crystalline lens, are not unfrequently followed by the formation of a cataract, and so are blows on the eye, which may be supposed to produce this effect by destroying some of the minute nutrient vessels naturally connecting the capsule with the lens. (*Beer*, *B.* 1, *p.* 218.) The treatment of these accidents resembles that of injuries of the iris, except that the surgeon has rarely any extravasation of blood to deal with. However, when the lens has slipped into the anterior chamber, Beer recommends its immediate extraction through an incision in the cornea, in order to prevent the eye from being destroyed by a violent attack of traumatic inflammation and suppuration. Nor when inflammation has come on, should this measure be postponed, as Beer has constantly found the disorder lessen, after the lens has been taken out.

Considerable wounds of the eye, attended with loss of the vitreous humour, are described by Beer as of a very serious nature; but they rarely take place accidentally, being almost always the consequence of a surgical operation. Accidental injuries of this kind are generally combined with so large or complete a discharge of the vitreous humour, and with such mischief to the organization of the eye, that the consequence is a loss of the eyeball, or such a dwindling of it, that the fissure of the eyelids becomes nearly closed. According to Beer's experience, injuries of the foregoing kind, arising from accident, are mostly produced by the horns of cows. On the contrary, the effusion of the vitreous humour in operations upon the eye, he observes, is seldom followed by the loss of the eye. Kortum, in his Manual on the Diseases of the Eye, adverts to some instances which he had seen, or fancies that he had seen, where *the whole of the vitreous humour was lost*, and yet the eyesight afterward became as strong as if no such accident had happened. On the other hand, Beer has never met with any of these fortunate cases; but has always found the sight to be seriously impaired when the quantity of vitreous humour lost has amounted to nearly its half, and that complete blindness was the result when the loss much exceeded that quantity. He conceives also, that Kortum had probably seen but few cases of this nature, and therefore might have been mistaken, as to the proportion of the vitreous humour discharged, which to the inexperienced seems larger than it really is, and he cautions surgeons not to promise too much in cases of this description. (*B.* 1, *p.* 222.) See *Cataract.*

Considerable injuries of the eyeball, complicated with a concussion, bruise, or actual wound of the retina, produce, either gradually or immediately, an amaurosis, which is almost always incurable. When the concussion of the retina is less violent, and does not affect every part of this texture, it may occasion only an amaurotic weakness of sight. In worse cases, the surgeon may think himself very successful if he can prevent the figure of the eye from being destroyed by the subsequent inflammation, all idea of the recovery of the eyesight being out of the question. The treatment is the same as that commonly adopted after operations for the removal of an opaque lens (see *Cataract;*) but there is one particular circumstance, sometimes attending injuries of the retina and ciliary nerves, claiming notice, viz. violent vomiting; a symptom which Beer says may even attend contusions of the sclerotica and of the ciliary nerves and retina, without any wound. Injuries of the ciliary nerves, he observes, are denoted by a very peculiar appearance; for, near the injured part, the iris is drawn up so close to the edge of the cornea, that its colour can scarcely be seen. When the surgeon is consulted in a case of this kind, though some inflammation may have commenced, the prognosis is yet favourable, in regard to the preservation of the eye; for a gentle opiate will relieve the vomiting when merely a nervous effect, not depending upon the loaded state of the gastric organs; but, if the case be of this last description, the primæ viæ should first be emptied. However, when a traumatic inflammation is completely established, before the treatment is begun, the eye is generally destroyed, as the repeated and violent vomiting cause a great determination of blood to the head and eyes, and increase of the inflammation; an effect which the opiates, given for the relief of the vomiting, also tend to produce

Beer has seen two cases in which the eye was pricked with a needle near the insertion of the external straight muscle into the sclerotica; in both instances, the punctures were so small, that they would scarcely have been found, had not the patients known their situation exactly by the pain, and they were then only perceptible with a magnifying glass. The punctures were soon followed by a convulsive rolling of the eyeball, and afterward by trismus, which continued severe in one patient a day and a half, and in another two days, but yielded to large doses of musk and opium given at short intervals, the warm bath, and the application of warm poultices containing hyoscíamus.

As chymical injuries of the eye produce an actual loss of substance, they are even more serious than common mechanical lesions. However, chymical injuries of little extent are generally repaired with tolerable facility and expedition. Quietude of the organ, and moderating the outward noxious effects by lukewarm mucilaginous applications, either in the form of fomentations, or eye waters, are the only requisite measures. If the cornea itself be hurt, as frequently happens when boiling hot fluids strike the eye, a kind of vesicle arises on the injured part, which becomes more and more white. The vesicle either bursts of itself, or subsides without breaking. In both cases, the production of the conjunctiva, of which the cyst of the vesicle is composed, shrivels up, and peels off, a new membrane of a similar nature being regenerated underneath. An opaque speck is frequently apprehended; but, says Beer, if the surgeon will merely avoid being too much in a hurry to open the vesicle, and not disturb the work of nature by applying various remedies to the eye, there will be no danger of such an occurrence.

More extensive chymical injuries of the eye, which at first are not in themselves very severe, frequently become dangerous, in consequence of care not being taken to prevent the influence of external stimuli. To this class of cases belongs the accidental sprinkling of the eye with boiling fluids, or strongish mineral acids. And even in these examples, says Beer, the prognosis is not unfavourable, and a complete recovery may be effected when the treatment is conducted according to the directions already given with respect to such accidents in general. While this author approves of cutting away any substance which is dead and partially detached, he strongly cautions surgeons not to remove the thin layer of the conjunctiva, nor to puncture any vesicle which may form.

When the burning or corrosion is not limited to the conjunctiva of the eyeball, but extends to the lining of one or both eyelids, Beer recommends covering the injured parts with mucilaginous applications, and mildly astringent ointments, containing tutty, or the white oxide of lead. In these cases, keeping the eye perfectly motionless must be hurtful, as it tends to promote the formation of adhesions, either between the eye and eyelids, (Symblepharon) or between the eyelids themselves. (Anchyloblepharon.)

Extensive, deeply penetrating, chymical injuries of the eyeball, Beer describes as being almost always followed by more or less impairment of the functions of the organ, or of some of its particular textures, because such accidents never happen without a loss of substance. Thus a part, or the whole, of the cornea may be entirely destroyed, as in injuries caused by quicklime; and, frequently, adhesions between the eye and eyelids, or between the two latter parts, cannot be prevented by any kind of skill. (*Beer.*) These serious degrees of mischief, as the same author observes, are mostly occasioned by slaked or unslaked lime, concentrated mineral acids, fire, &c. Unslaked lime, especially when extensively diffused over the eye by the immediate application of water, not unfrequently produces a sudden destruction of the whole of the cornea, which is changed into a grayish pappy substance, capable of being removed from the subjacent iris with a camel-hair pencil. Such an annihilation of texture, however, is generally restricted to particular points, or the surface of the cornea. Wherever this membrane has been so much decomposed that a manifest depression is directly perceptible in it when inspected sideways, a snow-white shining speck must be expected to be the consequence. Slaked lime never operates upon the cornea with so much violence, usually causing (as Beer states) only a superficial corrosion, or a coagulation of the lymph between the layers of the cornea. Nor are mineral acids, even when concentrated, generally so destructive to the cornea as quicklime; first, because, as fluids, they do not long remain in contact with the eye; and secondly, because the immediate mixture of the tears with them weakens their operation; whereas it only increases that of unslaked lime. The local treatment here consists in carefully removing every particle of the hurtful substance, afterward dropping frequently into the eye lukewarm mucilaginous decoctions or collyria, or covering the injured place with a mild cerate, and excluding the air and light from the eye. Every endeavour must also be made to prevent the formation of adhesions between the injured surfaces.

In very severe burns of the eyeball, of course, all idea of restoring its functions is out of the question. The violence of the injury is the greater, the more numerous the vesicles are upon the conjunctiva, and the more the eyeball and the iris are incapable of motion. Here the only indication is to moderate the inflammation, and avert such additional mischief, as might otherwise be produced by it. With this view, the eye should be kept at rest, and excluded from the light and air. According to Beer, the most common injuries of the eye, partaking both of a mechanical and chymical nature, are those caused by mortar, or the accidental touching the eye with hot curling irons. When the mortar contains no particles of quicklime, it often occasions, at particular points of the cornea, very white specks, which Beer describes as being composed of coagulated lymph, and admitting of dispersion. He even declares, that when the whole of the cornea is in this state, its transparency may be restored by proper treatment, as has been frequently exemplified to the gentlemen attending his clinical lectures. (*B.* 1, *p.* 234.) The pricking of the eyeball with a red-hot needle, and the stinging of it by bees, wasps, and other insects, are also both chymical and mechanical injuries. Whether the sting be left in the skin of the eyelid, or in the conjunctiva, or not, a considerable inflammatory swelling immediately takes place; and, if the sting be lodged, and not now taken away, the inflammation spreads, and the eye itself is endangered. In two cases, where the stings of bees were left in the skin of the upper eyelid, Beer has known gangrene arise in the short space of a day and a half, and the patients were saved with great difficulty. The treatment of such cases consists in immediately extracting the sting, if lodged, and applying folds of linen over the eye, wet with cold water.

After noticing the destructive effects of burning substances, the explosion of gunpowder, and fulminating silver, on the eye, (cases in which, when the functions of the organ are annihilated, the only indication is to diminish the subsequent inflammation and its consequences,) Beer inquires, what is the reason why the slightest mechanical, or chymical, injuries of the eye, in an apparently healthy subject, are sometimes followed by an immoderate degree of inflammation, and even the loss of the organ from suppuration? It is, says he, an observation made by Schmidt, that there are some eyes, which the greatest bunglers may abuse for hours at a time, without being spoiled, their powerful organization defying all such unskilful disturbance; while other eyes are met with, which the most skilful operators can hardly touch, without inducing a destructive degree of inflammation and suppuration. It was to this peculiar idiosyncrasy that Schmidt applied the term *vulnerability* (*Verwundbarkeit.*) Patients of this habit are said to possess an exceedingly fine soft skin, with a reddish polish upon it, and their cheeks are not only red, but exhibit a network of very minute vessels, which seem as if injected. Such individuals appear as if they were in the bloom of health; and, says Beer, in some respects they are really so. When their spirits are raised by the slightest causes, their complexion is universally reddened; but the least fear turns them as pale as a corpse. Their skin is described as being uncommonly irritable, sensible of every impression, and attacked with an erysipelatous redness, whenever any fatty substance touches it. In such habits, the utmost caution is necessary whenever the eyes have been injured, and the prognosis should be reserved. And, when an operation is to be done on their eyes, Beer recommends the previous exhibition of opium, and the application of a blister to some part of the skin, at a considerable distance from them. As a prophylactic measure, he also directs regular friction of the surface of the body.

In severe ophthalmies, particularly those which affect the eyeball itself, all mental emotions, anger, joy, &c. should be avoided. Hence, no talkative nor quarrelsome persons should be suffered to remain with the patient; and noisy children ought to be kept away from him. The apartment should be ventilated at least once a day, without the patient being exposed to any current of wind. All touching of the eye, or rubbing it with the bed-clothes during sleep, must be strictly prohibited. Stimulating, spicy food, spirituous drinks, and great bodily exercise are likewise to be forbidden. In the list of things which have a hurtful effect, Beer also includes all exertions of the lungs, every kind of disturbance, an atmosphere impregnated with tobacco-smoke, &c.

Having fulfilled the first general indication by removing, if possible, every kind of irritation acting upon the eye, the *second general indication* specified by Beer as proper in the first stage of ophthalmy, is to be observed, which is to *moderate, according to the degree of inflammation, the agency of several things to the effect of which the organ is naturally subjected.* Thus, the inflamed eye should not be exercised, even though the eyeball itself may not be immediately inflamed; and the operation of the light and air should be diminished partly by green silk eye-shades, and partly by window-blinds. Attention to this rule is still more necessary, when the eyeball itself is affected. With respect to the exclusion of light, it is to be well remembered, that it is only adviseable, as Dr. Vetch observes, in the very early stage of inflammation, the eye becoming more irritable and less manageable, when the access of a moderate degree of light is afterward prevented. (*Vetch on Diseases of the Eye, p.* 16.)

The *third general indication,* mentioned by Beer, as proper in the first stage of ophthalmy, when the disorder threatens to extend to the whole organ, and to bring on a febrile disturbance of the system, is to counteract these effects by covering the eye with folded linen wet with simple cold water, or vinegar and water; and having recourse to leeches, or when the nature of the case allows, to scarifications. (*B.* 1, *p.* 242.) Here, however, it merits particular notice, that, Beer, in expressing a general preference to cold lotions in the first stage of ophthalmy, differs from Richter, Scarpa, and Mr. Travers, (*Synopsis of the Diseases of the Eye*, *p.* 250.) all of whom, in the painfully acute stage, recommend tepid emollient applications.

With regard to leeches, also, the late Mr. Ware objected to their being put on, or very near the eyelids, as they sometimes cause a considerable swelling of these parts, and increase, instead of lessening the irritation. In ordinary cases, his method was to apply three on the temple, about an inch and a half from the outer part of the orbit. Scarpa recommends applying the leeches to the vicinity of the eyelids, especially about the inner canthus, on the vena angularis, where it joins the frontal, deep orbitar, and transverse vein of the face. Beer prefers nearly the same situation, as that specified by Scarpa, viz. the inner canthus, immediately below the under eyelid; and he forbids the application of leeches above either canthus, as likely to produce a disagreeable ecchymosis in the cellular membrane of the upper eyelid. The number of leeches, and the time, which they should be allowed to suck, he thinks, ought to depend upon the severity of the inflammation. According to Beer, when this mode of bleeding is to be of any service, the patient will experience a considerable abatement of the throbbing pain, tension, &c. in the affected eye. Hence, when any of the leeches fall off prematurely, the bleeding from the bites is to be kept up, with a sponge dipped in warm water, until such relief is felt. In the acute stage, Beer considers the abstraction of blood by means of scarifications rarely admissible. (*B.* 1, *p.* 243.) Mr. Travers also sets down scarifications of the conjunctiva as mostly objectionable in the acute stage; though highly beneficial in the chronic, where the lining of the eyelids is thickened and over vascular; and a considerable discharge of blood may be thus obtained, if the operation be briskly done with a sharp lancet, and the lower lid kept everted, and fomented. The same gentleman states, that cupping has a decided superiority over leeches, but that both are well adapted to relieve local congestion. Yet, he deems these methods too indirect to answer as substitutes for the lancet, where it is desirable to make the system "sustain and feel a reduction of power," in which case blood must be taken from a vein, or the temporal artery. (*Synopsis, &c p.* 249.) While inflammation of the conjunctiva is described by Dr. Vetch, as not much affected by bleeding, unless the quantity of blood taken away be such as to occasion syncope, he states, that the abstraction of blood, in quantities proportioned to the violence of the symptoms, more especially, by means of cupping and leeches, has for the most part sufficient control over the various states and individual symptoms of sclerotic inflammation. In some obscure cases of what this author terms amaurotic inflammation, he has seen great benefit derived from the application of leeches to the septum nasi, and he represents their being put directly on the conjunctival lining of the eyelids, as being sometimes more advantageous than on the adjacent integuments the orifices bleeding with great freedom. (*On Diseases of the Eye*, *p.* 15.)

If some of the above remarks are correct, scarifications are rather too boldly praised by the late Mr. Ware, as applicable to the acute stage of ophthalmy. But, supposing the first violence of the attack past, his recommendation of the practice either in the vascular and turgid state of the lining of the eyelids, or in the eversion of the lower one from a similar cause, seems perfectly unobjectionable. When the upper eyelid was very œdematous, and its thickness prevented the application of proper remedies to the eye, Mr. Ware also thought a few punctures near the ciliæ useful, by causing a discharge of bloody serum, and a quick subsidence of the swelling. And he speaks of the excision of a piece of the excessively tumid lining of each eyelid, in cases of ophthalmy with eversion, as having afforded great and speedy relief. (*Ware on Ophthalmy. &c. p.* 39.)

The fourth general indication, enumerated by Beer, is that, which has for its objects a diet and regimen suited to the state of the case, after it has attained a degree, in which its effects begin to be felt throughout the system. When therefore the plan is to be rigorously practised, the patient's ordinary diet is to be reduced, and he is to be allowed only vegetable food, cooling drinks, water, weak lemonade, &c. And not merely the eye itself is to be kept at rest, but the whole body.

Should the disorder be further advanced, and attended with a great deal of inflammatory fever, the observance of the foregoing indications will not suffice for checking the inflammation and preventing suppuration, unless the *fifth indication*, laid down by Beer, be fulfilled, which *is to employ such remedies as operate upon the whole constitution.* 1. Purgative and gently aperient medicines, which will empty the bowels well, and lessen the determination of blood to the head and eyes. 2. Clysters, which are useful on the same principles. 3. The frequent exhibition of the nitras potassæ. 4. General bleeding, the efficacy of which will much depend upon the blood being voided in a full stream. Beer seems to prefer opening a vein on the foot; but, in England, the most experienced practitioners generally open a vein in the arm, and sometimes the temporal artery. The blood, as Beer remarks, should be allowed to flow until the hard small pulse rises and becomes plainly softer; for, otherwise the operation will be completely useless. Also, when in these cases, general bleeding is no longer indicated, the employment of leeches will yet be advantageous, and afterward, scarifications may be practised, which, at any earlier period, would have aggravated all the inflammatory symptoms.

By strict attention to the five above explained indications, either without precipitation, or too much delay, the first stage of ophthalmy, even when in its most violent degree, may be certainly checked and resolved; and all suppuration avoided, so that the eye may be restored to a perfectly sound state again, provided the patient, previously to the attack, was quite healthy, and of course the affection of the eye a genuine idiopathic inflammation. (*Beer, B.* 1, *p.* 246, 247.)

Respecting the *prognosis* and *indications in the second stage of ophthalmy in general, and of idiopathic cases in particular*, Beer offers many interesting remarks. He observes, that when ophthalmy has reached its second stage, which may be known by circumstances already referred to in the preceding columns, it must be clear, that the above indications are no longer valid, and the fulfilment of them would destroy the eye.

In the second stage, every thing which has a tendency to produce further weakness of the eye must be avoided, or suppuration will be the consequence: *the first indication*, therefore, specified by Beer, *is to let the eye be cautiously exposed according as its tendency will allow, to its wonted stimuli again.* 1. By letting fresh, dry, and, if possible, a warmish air, have free access to the organ. 2. By exposing the eye to as much light (not of a reflected description) as can be borne, not only without difficulty, but with pleasure; 3. By moderately exercising the organ, especially in the inspection of agreeable diversified objects; a plan, which is of infinite service, when the eyeball itself has been affected.

The *second indication*, proposed by Beer *in the second stage of ophthalmy in general, is to apply tonic remedies, particularly those of a volatile kind, to the eye, which are to be discontinued in the event of suppuration.* 1. Beer praises the application of well-warmed linen compresses, which, if necessary, may be sprinkled with camphor; or, in urgent cases, he uses little bags of aromatic herbs and camphor; a practice, in which I am disposed to think surgeons here will have little or no confidence. 2. However, when the eye is too irritable to bear the application of bags of aromatic substances, Beer sanctions the employment of poultices made of bread crum and warm herbs, or the pulp of a roasted apple. But, this experienced author is very particular in qualifying his approbation of moist applications with a caution, that they must never be allowed to become completely cold on the eye, whereby they would do more harm in a quarter of an hour, than any good, which may have been attained in many hours by their previous use. Hence, Beer employs poultices only in cases of necessity. In this country, "when the extreme vascular congestion and excessive sensibility are reduced, and the inflammation tends to become chronic, the use of cold lotions, of a slightly tonic quality, is substituted with great advantage for ablutions of warm water. The sulphates of alum and zinc are the best." (*Travers, Synopsis, &c. p.* 252.) The employment of astringents also agrees with the advice delivered by Richter and Scarpa. Here then we find a point on which Beer differs from the generality of writers; but, nothing is clearer to me, than that his alarm about the ill effect of cold upon the eye in the second stage of ophthalmy is only the fruit of some theories, which he entertains, and not of impartial experience. 3. When there are small ulcers, or pustules, on the eyeball itself, Beer assures us, that great benefit is derived from dropping between it and the eyelids a tepid solution of the lapis divinus, the composition of which is elsewhere described (see *Lachrymal Organs*,) and bathing the eye with the same application, to which a little of the vinous tincture of opium is added. Should this remedy fail in checking the progress of the ulcers, or pustules, Beer recommends the addition of acetate of lead. 4. And, says the same author, when no decided amendment is produced, within twenty-four hours, the suppurating points must be touched once or twice a day, according to the urgency of the danger, with a camel-hair pencil, dipped either in a watery solution of opium, or the vinous tincture of opium. In the worst cases, he even directs Hoffman's balsam, vitæ, naphtha, or the Peruvian balsam to be mixed with the vinous tincture of opium.

But, Beer observes, that when these remedies have been too precipitately employed, and any granulations, or excrescences form, the treatment must be less active, and then these new productions will frequently recede of themselves; but, if they should not do so, they may be removed with burnt alum, or caustic. (*B.* 1, *p.* 252.)

The third rule, laid down by Beer, *in the treatment of the second stage of ophthalmy*, cautions the practitioner not to apply the caustic or the knife, to any of the morbid changes, which either originate during the first stage, and continue in the second, or make their first appearance at the period of suppuration, as, for instance, opacities of the cornea, eversion of one or both eyelids, &c. However, as exceptions to this advice, Beer adverts to the treatment of new-growths under the circumstances above specified, and to that of abscesses of the eyeball, where the matter is of an unhealthy quality, and so copious as to make an opening adviseable, which practice, however, as a general one, he condemns. The other morbid changes, already alluded to, the practitioner must endeavour to remove simply by proper treatment of the second stage. (*Beer, B.* 1, *p.* 254.)

Beer's *fourth rule in the treatment of the second stage* of ophthalmy in general, and of idiopathic ophthalmy in particular, when the suppurative process is extending itself, and threatening to impair the health, is, 1st. To allow the patient such food as is both easy of digestion, and of a very nutritious quality, and even a moderate quantity of wine and spirituous drinks, if he has been accustomed to them. 2dly. To direct the patient to keep his eye exposed the greater part of the day, in a fresh, dry, and (if possible) mild air, and take just exercise enough in various ways to produce a slight degree of fatigue. 3dly. When the eye itself is affected with suppuration, and the sight is either thereby much impaired, or quite lost, and, of course, the patient very unhappy and depressed, Beer considers it highly beneficial to let his spirits be improved by society.

The *fifth rule*, or, *general indication in the second stage*, laid down by Beer, refers to the necessity of supporting the constitution, when the suppurative process is attended with a general febrile disturbance. For this purpose, he recommends, 1st. The exhibition of calamus aromaticus, naphtha, and camphor. 2dly. If they prove ineffectual alone, they are to be joined with other tonics, especially bark. 3dly. The warm bath, which, in consequence of the sympathy between the skin and eyes, is particularly efficacious. 4thly. Rubefacients applied not far from the eye; means, which are exceedingly beneficial in the second stage of ophthalmy. (*B.* 1, *p.* 257.)

As an appendix to these general remarks, delivered by Beer, on the general treatment of ophthalmy in its first and second stages, I annex the sentiments of some other writers, as either confirming, or rendering questionable, some of his statements.

According to Scarpa, when bleeding and other evacuations have been practised, the next most useful measure is the application of a blister to the nape of the neck. He observes, that the skin here and behind the ears, has a stronger sympathy with the eyes, than any other part of the integuments. On the other hand, the late Mr. Ware preferred blistering the temples, and says, "When the leeches have fallen off, and the consequent hemorrhage has ceased, I would advise a blister of the size of half a crown to be applied on the temples, directly over the orifices made by the leeches, and I have found, that *the sooner the blister has followed the bleeding, the more efficacious both have proved.*" He adds, that when ophthalmy is very violent, and resists common methods, the most beneficial effects are sometimes produced by the application of a blister large enough to cover the whole head. (*P.* 43, 44.)

With respect to blisters, another modern writer particularly objects to their being applied near the eye, or on the temples, "where they never fail to prove injurious." There is (says he) "but one exception to this, as a general rule; for, it would seem, that blisters applied to the external surface of the palpebræ, in cases of purulent ophthalmia, tend considerably to diminish the purulency and chemosis." (*Vetch on Diseases of the Eye, p.* 17.)

In the second stage of acute ophthalmy, the vinous tincture of opium (the tinctura thebaica) has been very extensively used, as a topical application. In common cases, two or three drops may be insinuated between the eyelids and globe of the eye, twice a day; but, in other instances, attended with more sensibility, once at first will be sufficient. The late Mr. Ware, who brought this application into great repute, found, that introducing two, or three drops, of this medicine at the inner canthus, and letting them glide gradually over the eye, by gently drawing down the lower eyelid, proved equally beneficial, and less painful than letting them fall directly upon the eyeball. Immediately the application is made, it usually creates a copious flow of tears, a smarting, and a sense of heat in the eyes; which inconveniences, however, soon cease, and the eyes become clearer, and feel decidedly improved. But, notwithstanding every exaggeration, unbiassed surgeons are now fully convinced, that the vinous tincture of opium is a proper application only when the inflammatory action has been previously diminished by bloodletting, aperient medicines, and blisters, and when the action of the vessels has been weakened by the continuance of the disease. Nor is any doubt entertained, that the late Mr. Ware went much too far, when he recommended the vinous tincture of opium, as a most effectual application in every species and stage of the disorder, from the most mild and recent to the most obstinate and inveterate. (*P.* 51.) Scarpa has seen the necessity of limiting the use of the remedy in question, and has expressly pointed out, that it is useful only when the violence of the pain, and the aversion to light, have abated. Indeed, Mr. Ware himself, a little before sanctioning its employment in all cases, has acknowledged, that, in certain instances, in which the complaint is generally recent, the eyes appear shining and glossy, and feel exquisite pain on exposure to the light, no relief at all was obtained. (*P.* 48, 49.) Mr. Travers has remarked, that "there are inflammations, which assume a chronic character in their commencement, evidently depending on a state of atony, of very partial extent, void of pain, and scarcely possessing any sign of inflammation, except the congestion of the vessels, or, if any, so feebly marked, as to encourage us to disregard them in the treatment. In such cases, a single stimulus will often restore the healthy action at once. The vinous tincture of opium has acquired a nostrum-like importance from its restorative operation in such casas; a virtue, I believe, not proper to it. A drop or two of the zinc, or the lunar caustic solution, or water impregnated with calomel, or a minute portion of the citrine ointment, or any other stimulant, would do as much." (*Synopsis, &c. p.* 252.)

Whenever the patient can easily bear a moderate degree of light, Scarpa directs all coverings to be removed from the eyes, except a shade of green, or black silk. A brighter light should be gradually admitted into the chamber every day, so that the eyes may become habituated, as soon as possible, to the open daylight; for, as Scarpa truly states, nothing has a greater tendency to prolong and increase the morbid irritability of the eyes than keeping them unnecessarily long in a dark situation, or covered with compresses and bandages.

Dr. Vetch has such a dislike to the plan of covering the eye, that he never suffers a shade to be worn, conceiving that, in conjunctival inflammation, it always does a great deal of harm by preventing a free exposure of the eye to a temperate atmosphere. (*On Diseases of the Eye, p.* 17.)

Besides the common remedies for inflammation, there are some very powerful means, which may be employed for the relief of particular states of ophthalmy with great effect. Thus, as the latter author has observed, by means of hysosciamus, belladonna, and stramonium, (See *Belladonna*) the important structure of the iris may be secured from injury, at the same time that other measures are adopted for checking the inflammation. Such medicines may even be applied, as a mechanical force, for detaching any recent adhesion. (*Op. cit. p.* 18.)

The uses of the argentum nitratum are also very extensive: "the slightest application of it in substance (says Dr. Vetch) can often remove the highest degree of morbid sensibility to light, and instantaneously restore quietude to the organ; it can prevent incipient changes, and obviate advanced ones; and may also be used in solution, as a valuable sedative."

The mention of so stimulating and active a substance as the nitrate of silver having a sedative effect may excite surprise; but the fact is unquestionable, and well illustrated in the treatment of several diseases. (See *Cornea* and *Iris*.) As another modern writer correctly states, it is remarkable that even the weaker forms of medicated lotions irritate, and none more than such as contain opium. The relief, afforded by anodyne fomentations in general, is very various. "I have known them (says Mr. Travers) objected to as painful, and patients inquire if they might not substitute warm water for the aqueous solution of opium and infusions of poppy and hemlock. The same observation applies especially to painful herpetic cutaneous affections, and acutely irritable ulcers. Upon these a solution of opium often acts as a stimulant, and augments pain, while the lunar caustic solution as often assuages it." At the same time, Mr. Travers admits, that exceptions occur, and that he has met with cases, "in which no other application than the aqueous solution of opium could be borne." He has also known the vapour of laudanum afford the most marked relief to the irritability to light accompanying strumous ophthalmy. (*Synopsis of the Diseases of the Eye, p.* 251.)

According to Dr. Vetch, it is impossible, in cases of conjunctival ophthalmia, to possess an application of greater efficacy, than the undiluted liquor plumbi subacetatis, for altering the morbid and purulent state of that membrane; he also describes nicotiana externally employed as a narcotic and astringent, as being of singular service in lessening the pain, and tumefaction. (*P.* 19.) However, the discordance among the best writers, about the effects of favourite local applications, would lead me to enjoin rather attention to the leading principles of the treatment, than confidence in the superior efficacy of any particular drug or composition. As also the local applications should vary in the different stages of purulent ophthalmy, no single one will always be right. If Beer had delivered no observations of greater importance, than his condemnation of Bates's camphorated lotion, and his praise of other styptic stimulating applications, his remarks would be of little value; but, as he has pointed out the different stages of purulent ophthalmia in a very correct manner, and adapted his remedies to these various states of the disease, his information comprehends scientific principles, and becomes peculiarly interesting. The same praise belongs also to Dr. Vetch's observations on purulent ophthalmy, who, in some points, both of the description of the complaint and its treatment, has surpassed Beer.

Of the different Kinds of Ophthalmy. Beer's classification is very comprehensive. According to the situations, in which ophthalmic inflammation first originates, he proposes a general division of it into three forms, as suggested by some of the older writers; viz. *inflammation of the eyelids, or blepharophthalmitis; inflammation of the parts between the orbit and globe of the eye;* and, lastly, *inflammation of the eyeball itself or ophthalmitis.* He observes, however, that these distinctions seem to assign a considerable extent to the original seat of the affection; for, the expression, *inflammation of the eyelids,* can only denote a case, in which the disorder begins at once in all the parts composing the eyelids. In the same way, inflammation *of the parts between the eyeball and orbit* appears to signify, that all those parts constitute the original sphere of the complaint; while *inflammation of the eyeball* seems to denote that the disorder has begun at once in all the textures, of which this organ is composed. But, fortunately, as Beer remarks, the extent of the original seat of genuine idiopathic inflammation of the eye is but seldom thus considerable; being mostly restricted to particular textures, from which it first spreads further only when neglected, or injudiciously treated. Hence, certain subdivisions of the complaint are necessary; and, accordingly, Beer subdivides *inflammation of the eyelids,* first, into the *erysipelatous,* or *blepharophthalmitis erysipelatosa,* which commences in the integuments of these parts. Secondly, into that, which originates at the edges of the palpebræ, in the conjunctiva lining these parts, and the

Meibomian glands, and which Beer denominates *glandular inflammation of the eyelids* or *blepharophthalmitis glandulosa;* a case, described by writers under an infinite number of names, and often confounded with complaints of a totally different nature. Thirdly, when the effects of the inflammation are confined to a small portion of the eyelid, it constitutes the disease, termed the *inflammatory stye,* or *hordeolum,* which Beer says is rarely a simple inflammation, but complicated with a scrofulous habit; a proposition, which, I think, will not receive any credit in England. Fourthly, as there is one more form of inflammation of the eyelids, Beer gives it the name of the *erysipelatous swelling of the cornea of the eye,* or *anchylops erysipelatosa,* which affects the skin of the inner canthus, immediately over the lachrymal sac. The name, here suggested, expresses precisely the seat of the inflammation, and, as Beer thinks, will tend to prevent the case from being mistaken for inflammation of the lachrymal sac. *Inflammation of the parts in the orbit* comprehends, first, *inflammation of the lachrymal gland;* secondly, *inflammation of the lachrymal sac,* a disorder, which begins in the lachrymal sac and nasal duct, and generally extends with great rapidity over all the excreting parts of the lachrymal organs; and, thirdly, *inflammation of the caruncula lachrymalis,* or the *encanthis inflammatoria.*

In the same way, inflammations of the eyeball admit of a classification, which is of the highest practical importance, first, into the *erysipelatous inflammation of the sclerotic conjunctiva,* the *ophthalmitis erysipelatosa,* which denotes that form of the disorder, which is first entirely confined to the membrane connecting together the eyelids and eyeball. Secondly, into *inflammation of the outer textures of the eyeball,* the *ophthalmitis externa,* originating in the cornea and sclerotica. Thirdly, into *inflammation of the innermost textures of the eyeball,* the *ophthalmitis interna,* which has two forms highly necessary to be recollected in practice; for the inflammation may begin immediately in the retina choroides, the membrane of vitreous humour, &c. and spread from these textures to all the rest of the eyeball, being named *true internal inflammation of the eyeball,* or *ophthalmitis interna vera,* and thus discriminated from another case, which is originally seated in the iris, the adjoining corpus ciliare, the lens, and its capsule, and afterward extends from these parts to the more deeply situated coats, and to the texture of the vitreous humour. This last form of internal inflammation of the eyeball is named both by Schmidt and Beer, *iritis.* The classification then embraces a view of the different forms of ophthalmy, as modified by constitutional causes, as the effect of contagious and infectious diseases, measles, small-pox, &c.; and as a complication of certain cachexiæ, like gout, rheumatism, and scurvy.

Although I have thus given a brief delineation of Beer's classification of ophthalmic inflammations, it is not my design in the subsequent columns, to enter into a full consideration of every particular case, above enumerated; first, because the limits of this work will not permit me to do so; and secondly, because some of these cases have been already considered in other parts of the work. (See *Lachrymal Organs.*)

Common Inflammation of the Eyelids. This form of disease is said by Beer to affect the upper much more frequently, than the lower eyelid, because the former obviously has a larger surface exposed to injuries from without; nor does the complaint always spread to the latter. From the margin of the eyelid, a very red, tense, painful swelling arises, attended with heat, throbbing, and a great deal of tenderness, when touched. It gradually extends over the whole eyelid: but seems to be plainly bounded by the edge of the orbit. The motion of the eyelid is always more or less obstructed, and, at length, when the inflammation has reached its greatest degree, it is completely prevented. Nor is there any difficulty in comprehending why, when the inflammation has become severe, the eye should be excessively dry, and every attempt on the part of the patient to move the eyelid should be productive of considerable pain, and of a sensation, as if some sharp extraneous substances lay under the lid; for at this period, the palpebral conjunctiva is already severely inflamed, and, consequently, the secretion of mucus from the Meibomian glands is immediately stopped by the inflammation itself, while that of the tears is interrupted partly by the extension of the inflammation to the sclerotic conjunctiva, and partly by the effect of the sympathetic connexion existing between the conjunctiva of the eyelid, and that of the eyeball. To this last cause, viz. sympathy, Beer refers the supervening dryness and shrivelling up of the lachrymal papillæ, as well as the apparent closure of the puncta lachrymalia, and the uneasy dry state of the edges of the eyelids. Hence, also, the dryness of the adjacent nostril, and a very disagreeable smell of dust obliging the patient to sneeze repeatedly, which act is constantly attended with a great increase of pain in the swelling, a transient shooting of it to the eye and head, and a sensation as if flashes of light were elicited within the eyeball; a kind of hallucination, technically named *photopsia.* As the original seat of the inflammation is already extensive, one may readily understand, says Beer, why the affection in its first stage, particularly when neglected, or badly treated, should frequently give rise to some febrile disturbance of the system.

In the second stage of the case, or that of suppuration, which follows when the inflammation is violent and not soon dispersed, matter forms with the annexed train of symptoms. The redness suddenly increases very much, the eyelid becoming of a brownish red, and lastly of a purplish red colour. The swelling becomes more prominent, and presents a conical eminence, either in the middle of the eyelid, or close to the outer or inner canthus. The pain is irregular, and of a stinging, burning kind, a throbbing being felt only in the deeper part of the tumour. At length, the swelling becomes somewhat softer, and less sensible at its most projecting point. The secretion from the Meibomian and lachrymal glands, which in the first stage of the disorder was suppressed, is now quite re-established, but more copiously, than in the healthy state. During sleep, a quantity of mucus accumulates between the edges of the eyes, and glues them together. An extraordinary sensation of cold and heaviness is felt all about the eye. Ultimately the most prominent point of the swelling presents a pale red colour, followed by a yellowish livid tinge. As the abscess is now completely formed, the fluctuation of the matter can be plainly felt. (*Beer, B.* 1, *p.* 269, *&c.*)

According to the same author, nothing very particular is known respecting the causes of the preceding form of ophthalmic inflammation, and, with the exception of blows, he has not been able to discover the precise circumstances which give rise to it.

With regard to the prognosis, if the treatment be neglected, or injudicious, the inflammation may suddenly become so violent, as to produce in weak subjects gangrenous mischief. But, when the case is properly managed in its first stage, the second, or that of suppuration, never ensues; yet, says Beer, the curative measures must be decisive, and valuable time not wasted on trifling means, although due regard must be paid to the constitution. When the inflammation subsides favourably, it leaves no vestiges of it behind, and even the redness, which is the latest in disappearing, completely goes off in a few days, and the function of the eyelid becomes perfect again.

If gangrene and sloughing take place, the outer coverings of the eyelid are destroyed, and the consequences are an incurable eversion of the part. (See *Ectropium*) or a hare-eye, (see *Lagophthalmus.*) When suppuration happens favourably, the abscess sometimes breaks very well of itself on the upper eyelid; but, according to Beer, this does not readily occur on the lower one, nor without the formation of sinuses, which sometimes run quite into the orbit. After the abscess has burst, or been opened, the part heals up with great celerity in favourable constitutions, but slowly in others; vermilion granulations arise from the bottom of the cavity, and a cicatrix follows which is scarcely perceptible. When the abscess is very large, however, and bursts of itself, the upper eyelid continues for some time very much weakened. If the collection of matter be neglected, or wrongly treated, or the subject be unhealthy, or the disease be aggravated by the effects of a damp atmosphere, hurtful food, severe mental trouble, wet poultices, or too long confinement of the matter, then, says Beer, fistulæ are apt to be produced, sometimes complicated with necrosis of the bone, the certain effects of which are some permanent and mostly incurable disease of the eyelid, and impairment of its functions: 1st. A closure of the lachrymal canals, with a permanent stillicidium. 2. A complete obliteration of the same tubes, with an incurable stillicidium. 3. A prolapsus of the upper eyelid, from distention of the skin by the long confinement of the matter. 4. Inversion of the edge of the eyelid, from a shrinking of its cartilage. 5. Eversion of the eyelid, and hare-eye, from loss of skin. (*Beer.*)

As, in this species of inflammation, says the same author, the organ of sight cannot well be affected, unless the disorder afterward extend itself very much, the exclusion of air and light is here but of little use. Linen compresses, well wet with very cold water, or vinegar and water, are to be applied; and, while the complaint is local, leeches are to be used; but, if the constitution be threatened with febrile symptoms, then Beer urges the necessity of venesection, low diet, purgatives, and general antiphlogistic measures. (*B.* 1, *p.* 275.)

In the second stage, with the exception of a few points, Beer states, that the case is to be treated like any other common abscess. When the matter is situated in the middle of the upper eyelid, not far beneath the skin, the abscess may be allowed to burst of itself, especially, if the patient have a great dread of the knife. But, if the matter lie near the outer, or inner canthus, it should be let out with a lancet as soon as its fluctuation is quite distinct, the incision being made in the direction of the fibres of the orbicular muscle. When fistulæ, or gangrene, have already taken place, the treatment should be like that, which is applicable to the same kind of mischief in most other parts of the skin.

Erysipelatous Inflammation of the Eyelids usually affects both these parts together, very seldom only the upper one, and never the lower alone. When also both are affected, the disorder always presents itself in the greatest degree in the upper eyelid. A pale, yellowish red, seemingly transparent, shining swelling arises from the edges of the eyelids, and rapidly extends itself, without any determinate boundary, the faint red colour being gradually lost upon the eyebrow above, and not unfrequently upon the cheek below. When the inflamed part is gently touched, the redness disappears, but only for a moment. At length, the swelling towards the margins of the eyelids becomes exceedingly soft, and feels like a vesicle that has been raised by a blistering plaster. The pain is inconsiderable, not attended with throbbing, but rather with a sense of heat and stiffness; when the part is slightly touched, the patient experiences a lancinating sensation in it. Its temperature is not much increased. The secretions from the Meibomian glands, lachrymal gland, and mucous membrane of the nostrils, are much augmented.—In a strong subject, the disorder, if genuine and idiopathic, is not productive of any constitutional disturbance; but, in bad habits, and weak females and children, it is sometimes attended with fever. However, when the complaint partakes of the phlegmonous character, and is badly treated, the general symptoms are occasionally very severe at the change from the first to the second stage, and the case may then terminate in a gangrenous kind of suppuration. In irritable, delicate children, says Beer, when the disease spreads over the face, the case requires the most skilful treatment for the prevention of a disastrous termination.

In strong persons, the second stage of this disorder rarely ends in a manifest suppuration; but there is rather an exudation of lymph, which becoming dry, forms very small, delicate, branny scales, in the composition of which the desquamated cuticle has also a considerable share. In other instances, vesications of various sizes are formed on the erysipelatous surface, and burst, and discharge a fluid, which is converted into yellowish scabs.

According to Beer, the skin of the eyelids is particularly prone to erysipelatous inflammation, which is therefore more easily induced in it, than in the integuments of other parts. Beer considers the sudden effect of a cold blast of air, or of very cold water, upon the skin of the eyelid, while in a state of free perspiration, as the most common cause of its being attacked with erysipelas, particularly in weak subjects. He states, however, that the complaint may be occasioned by the stings of bees, wasps, and other insects; accidents, which when the stings are not extracted, are liable to be followed by a violent and dangerous general inflammation of the eyelid, not unfrequently extending in a perilous degree to the eyeball itself. (*B.* 1, *p.* 281.)

With regard to the prognosis, no other case of ophthalmic inflammation so frequently subsides without the aid of surgery as this, provided the constitution be healthy and strong; and, when the complaint is resolved in its first stage, the vestiges of it afterward are as little as those consequent to common inflammation of the eyelids.

The second stage, however well treated, is followed for a long time by a peculiar sensibility of the skin to the impression of cold damp air, and a strong propensity to relapses. If, when the cuticle peels off, a patient of weak constitution sit in a current of damp cold air, or try to wash away the scales and scabs with cold water, Beer states, that an œdematous affection of the eyelid will be produced, which is often very obstinate, and apt to occasion a temporary inversion of the ciliæ (*Trichiasis*,) or a similar state of the edge of the eyelid (*Entropium.*) And, he observes, that when from neglect, or bad treatment, an erysipelatous inflammation of the eyelid terminates in suppuration, the abscess is not like a common one, but the matter rapidly makes its way out through several openings in the already partially disorganized skin, and, in general, this state is followed by ill-conditioned tedious ulcerations, whereby a good deal of skin is always destroyed. Under these circumstances, all those consequences may be produced, which have been described as liable to take place from the second, or suppurative stage, of common inflammation of the eyelid. Gangrene and sloughing may even occur, when erysipelas of the eyelids is brought on by the unremoved sting of an insect, and efficient treatment is delayed.

The treatment, recommended by Beer in the first stage, consists in the application of cold water, and he remarks, that exposure of the part for a time to a cool, moist, but, in other respects, pure atmosphere, will often suffice for the removal of the complaint. When, however, the disorder increases, and assumes a phlegmonous character, the directions given for the treatment of blepharophthalmitis, are to be followed.

In the second stage of erysipelas of the eyelids, Beer praises the good effects of a mild, dry air, of an equal temperature, and recommends covering the parts with a light bandage, under which are to be put well warmed linen compresses, which, for weak persons, should be sprinkled with camphor; or he directs the eyelids to be covered with bags of aromatic herbs; generally a very favourite plan with Beer, whenever he objects to moist applications. In such individuals, he observes, that the cure is promoted by keeping up the function of the skin with gentle diaphoretic medicines, with which, when the debility is very great, camphor should be joined. Should an abscess form, the same treatment is proper as in the second stage of common inflammation of the eyelids, or (what Beer calls) blepharophthalmitis.

Glandular Inflammation of the Eyelids, or *the Blepharophthalmitis Glandulosa*, as Beer terms it, is considered by this author as the disease, of which all the various cases of purulent ophthalmy are only modifications, which he describes under the names of *idiopathic catarrhal ophthalmy; idiopathic catarrhal-rheumatic ophthalmy;* and *blepharo-blennorrhœa*, or *ophthalmo-blennorhœa.* The two latter terms comprehend the purulent ophthalmy of infants, the Egyptian ophthalmy, the gonorrhœal ophthalmy, &c.

Glandular Inflammation of the Eyelids, Beer knew very well was so far a defective term, that it seemed to imply merely an affection of the Meïbomian and mucous glands of those parts, whereas he means to express by this name the kind of inflammation, of which all the cases, usually called in this country *purulent ophthalmies*, are varieties and modifications, and in which the conjunctiva is also particularly affected.

Acute suppurative inflammation of the conjunctiva, divisible into the mild and severe forms, as proposed by Mr. Travers, appears, perhaps, a better name (*Synopsis, &c. p.* 96, &c.) Dr. Vetch, who also prefers the general term *conjunctival inflammation*, observes, that from many internal and external causes, the membrane of the conjunctiva is liable to become the seat of inflammation, more especially that portion of it, which gives a lining to the inner surface of the eyelids. The disease, in its general nature, he says, differs little from that which is met with in other parts having a similar surface, as the nose, the fauces, the bronchial cells, and the urethra; but, the continuation of the membrane forward upon the anterior portion of the eye, and the consequent liability of the inflammation to affect this important organ, attach much interest to all the circumstances, capable of producing it. *(Vetch on Diseases of the Eye, p.* 148.) In the common glandular inflammation of the eyelids, described by Beer, which seems to me to correspond to the more moderate forms of *purulent ophthalmy* met with in this country, either the whole, or only that part of the edges, which is near one, or both canthi, is affected with a very red, hardish, sensible swelling, attended with a violent annoying degree of itching. This swelling, Beer observes, does not extend far over the outside of the eyelid upwards, or downwards, at most, not more than a few lines; but it spreads over the palpebral conjunctiva, especially when neglected, or badly treated, and the constitution is weak. This, he says, can only be discovered when the eyelid is everted. The further the swelling extends over the inside of the eyelid, the more is the motion of the part obstructed, not on account of any want of power in the orbicular muscle, but from the fear of the pain, with which every attempt to move the eyelid is accompanied. The itching, which continually distresses the patient, more or less, is often succeeded by an irritating, burning kind of pain, which is particularly experienced when the eyelids are moved, and hence, the patient is obliged, as it were, to keep his eye closed. While the inflammation is restricted to the edges and conjunctiva of the eyelids, and the Meibomian glands situated under it, though the secretion from these glands is entirely stopped, that from the lachrymal gland is much augmented, and consequently, the disease is associated with a true *epiphora*, which is seriously aggravated whenever the eye is exposed to a strong light. As, under these circumstances, the tears are not properly blended with the Meibomian secretion, they must of course be very irritating to the eye and its surrounding parts, and less fitted for properly lubricating its surface. Hence, the pain now becomes burning, and not unfrequently the cheek, over which the tears run, is excoriated. As soon as the inflammation of the eyelids spreads further, and begins to affect the sclerotic conjunctiva, the effusion of tears ceases, the eye becomes preternaturally dry, and the patient constantly thinks that he feels sand under the eyelids, which sensation is rendered almost intolerable by any motion of the eye, or eyelids. Children and women have so great a dread of this painful feel, that much persuasion is often requisite to induce them to let the eye be properly examined. If the glandular inflammation of the eyelids attain a considerable degree, the lachrymal papillæ shrink, and the puncta seem closed, which is particularly the case when the disorder begins at the inner canthus.

In the *second stage* of the complaint, Beer describes the itching, burning sensation, and dryness of the eye, as undergoing a remarkable diminution, as either the canthi, or the whole extent of the edges of the eyelids, become more and more moist, and smeared with mucus, *an increased secretion of a puriform sebaceous fluid from the Meibomian glands being the first symptom, denoting the commencement of the second stage of the inflammation.* As this mucous secretion is not mixed with an adequate quantity of tears, it inspissates in the form of white, thin, delicate layers, which, from time to time, cover the cornea, and make the patient very *apprehensive of becoming blind*, as the flame of a candle in the evening, and other objects appear to him more or less concealed by a dense mist. When, under these circumstances, however, the eyelids are repeatedly and briskly moved, or the eye is wiped, these appearances soon go off, the flakes of mucus being removed from the cornea. These accumulations of thickened mucus, Beer remarks, are apt to be most frequent and troublesome some time after a meal; and the eyelids become so firmly glued together during sleep with yellowish crusts, that, when the patient awakes in the morning, it is not till after a great deal of washing and bathing of his eyes with warm water, that he is able to open them again. The above described change in the quantity and quality of the secreted matter, as already mentioned, indicates the *first period of the second stage;* for Beer wishes it to be particularly noticed, that here, as in all inflammations of mucous membranes, the second stage of the disorder has three periods, as will be presently seen, to which the practitioner cannot be too attentive.

This morbid secretion of a mucous sebaceous matter does not continue long unattended with other effects; and, very soon, the peculiar appearances of suppuration are seen, at the same time that the conjunctiva of the eyelids becomes more considerably swelled, and a discharge takes place not only from the canthi or margins of the eyelids, but from the whole of the thickened villous surface of the palpebral conjunctiva, and which discharge is distinguishable at first view from the mucus, which, at an earlier period, accumulated in much smaller quantity only between the edges of the eyelids, and at the canthi. It is now no longer white, but yellow, completely like pus, with which it is in reality blended, and so viscid is it, that the crusts which collect on the eyelids in the nighttime cannot be removed, without pulling the eyelashes away with them. Sometimes, says Beer, at the moment of suppuration, minute pustules, which are scarcely distinguishable, form either at the canthi, or along the edges of the eyelids, and are soon burst by the constant friction of the parts. These pustules indicate the second, or *suppurative period of the second* *stage* of the case, when either merely the canthus, or the whole of the margin of the eyelid, constantly becomes excoriated, and secretes mucus and purulent matter, the sore fretted places smarting so severely on exposure to the air, particularly to such as contains a large proportion of carbonic acid gas and nitrogen, that the patient is afraid of opening his eye. When the patient neglects himself, and continues in an unhealthy atmosphere, these excoriations of the skin, occurring in the suppurative stage, are always more extensive; nay, they sometimes spread over the lower eyelid, and down the cheek.

At length, after the excoriations have lasted, perhaps, several weeks, the suppurative process is checked and suppressed, either by surgical treatment, or accidental favourable circumstances, as change of regimen, the weather, climate, &c., and then the excoriations immediately diminish. However, a morbid secretion from the Meibomian glands still continues, making the *third period of the second stage*, and is apt to become habitual, if not rectified by art, or removed by the effect of accidental favourable circumstances, when it changes into a thin serous discharge, and then terminates.

Beer refers the causes of *glandular inflammation of the eyelids*, or *simple purulent ophthalmy*, to the immediate operation of various stimuli acting chymically upon the edge of the eyelid, where it is covered with a very delicate cuticle, and upon the exposed follicles of the glands of the eyelid towards the inner canthus. Hence, says he, when many men are living together in a polluted, noxious air, impregnated with extraneous substances, this form of inflammation is found to occur even in the strongest constitutions with such frequency, that it seems as if it were epidemic. And, according to Beer, the principal cause of the disease will be found to be in the atmosphere, and the next most frequent occasion of it, he observes, is uncleanliness, as washing the eyes with foul water, &c. At the same time, this experienced oculist seems aware that this explanation would not of itself be always quite satisfactory; for, he adds, that although, under the above circumstances, no constitution, no sex, nor age, is spared, there must be some particular condition which is conducive to the disorder, or at all events, to its more rapid and severe course, and the quick extension of the inflammation in certain individuals, which condition Beer supposes must depend either upon weakness of constitution, or upon excessive irritability, or as he terms it, *vulnerability* of the whole surface of the body. Beer makes no mention of the effect of damp nocturnal air in warm countries in giving origin to purulent ophthalmy, so much insisted upon by Assalini and Dr. Vetch, but, which doctrine, in reference to the origin of purulent ophthalmies in England, I think completely fails; and what is still more worthy of notice, Beer never attempts to explain the propagation of the disease by its infectious nature. It is observed by Dr. Vetch, that the history of all diseases, originating from some particular impression received from the atmosphere, but capable, when formed, of propagating themselves by contagion, is rendered particularly difficult; because the same circumstances, which favour the communication by contagion, produce also a predisposition to be acted upon by the more general causes existing in the atmosphere. The principal cause which gives force and opportunity to the action of contagion, is the crowding individuals together into too limited spaces. The same circumstance Dr. Vetch has seen give a predisposition to diseases of an epidemic, but not a contagious nature; and hence he infers, that it may produce the same predisposition to diseases which are both contagious and atmospheric. "The appearance of ophthalmia among the crews of ships and in barracks was often met with long before the late destructive and virulent disease (presently to be described.) In the army, such an ophthalmia has extended to whole regiments, without any appearance of the disease among the inhabitants of the neighbourhood; and while the free intercourse which subsists among the men, as to washing in the same water, using the same towels, and sleeping more than one in a bed, readily accounts for the rapid extension of the disease in the same corps, yet the excessive crowding together of men will often of itself engender inflammation of the conjunctiva." (*Vetch on Diseases of the Eyes, p.* 171.) I believe, with respect to the causes of all purulent ophthalmies, our present knowledge will permit us to venture no further than the tenor of the preceding observations, which is, that they originate epidemically, but probably multiply both in this manner, and by the infectious matter of the disease being inadvertently applied in various ways to the eyelids of other persons. This species of inflammation of the eyelids is rarely met with by the surgeon in its first stage, because only very timorous patients then seek medical advice, and most individuals, who feel in other respects well, relieve themselves by washing the eyes with cold water, and applying cold poultices, made of bread crum softened in water. Besides, when the disease is not very severe, it frequently subsides of itself, as in a favourable constitution, a better air is sometimes capable of restoring the healthy state of the eye. If, however, the disease at its very commencement should be violent, or attack an individual of very weak habit, Beer states that it may immediately affect, not only the Meibomian glands, but the perichondrium of the cartilage of the eyelid, and produce an incurable entropium, which is also sure of taking place when the case is neglected, and followed by deeply extending ulcerative mischief. When the complaint is strictly idiopathic, it never brings on any general indisposition, except by improper treatment it should happen to be converted into a violent inflammation of the whole eyelid, or what Beer terms a complete *blepharophthalmitis;* which he says, only happens in weak subjects, and women and children, whose skin is in a very irritable state, or when a person of apparently good constitution remains under the influence of circumstances which tend to augment the inflammation, as for instance, exposed to the air of a stable, privy, &c. in which event, Beer describes the inflammation of the eyelids as being quite of a peculiar description.

As for the prognosis in the second stage, Beer observes, that, if the excoriations at the suppurative period should spread all over the edges of the eyelids, and compel the patient to keep his eye incessantly shut, a partial adhesion of the eyelids to each other (*anchyloblepharon*) may be the result. Also, when at either of the periods of the secretion of mucus, or at that of suppuration, the patient is content with merely softening with warm water the thick matter glueing the eyelids together, so as just to be able to open his eye; and does not completely free the eyelashes from the crusts, clusters of the hairs will project inwards, (see *Trichiasis*) whereby a secondary inflammation of the conjunctiva of the eyeball will be excited, which, Beer says, should be carefully discriminated from a mere extension of the glandular inflammation of the eyelid. Such a trichiasis, he observes, may easily become incurable, when the edge of the eyelid is seriously injured by the depth of the excoriations. But, if the suppurative process be restricted chiefly to the canthus, especially the outer one (which case, according to Beer, is not unfrequent in old, debiliated subjects, of a relaxed constitution) and if the excoriations should deeply penetrate the commissure of the eyelids this may be completely destroyed, and the lower eyelid everted.

As the state of the atmosphere, uncleanliness, crowded and close places, &c. are considered by Beer to be the principal causes of the glandular inflammation of the eyelids, or simple purulent ophthalmy, one of the most important indications, in the first stage of the disorder, seems to him to be the removal of these hurtful circumstances. And, he declares, that, if immediate attention be not paid to such indication, it will be quite impossible to prevent a dangerous increase of the disorder. A cool fresh air, and bathing the eye with cold water, or a weak lotion of vinegar and water, Beer represents to be means, usually adequate to stifle this inflammation in its birth. In the second stage, he says, the indication is entirely different.

But, also in the beginning of this stage, and even at its second period, namely that of suppuration taking place, the disorder, according to Beer, seems for a short time to be benefited by the employment of cold water, but the consequences are rendered by such treatment a great deal worse; for a fresh, much more extensive inflammation of the same kind again takes place. At the first period of the second stage, viz. while the secretion is a pure mucous and sebaceous matter, Beer says, that it is absolutely necessary to employ such external means, as are calculated to promote the action of the veins and absorbents. For this purpose, he recommends the following collyrium: ℞. Aq. rosæ ℥iv. Hydrarg. oxymur. gr. j. vel. gr. dimidium. Mucil. sem. cydon. ʒj. Tinct opii vinos. ℈j. Misce. This eyewater is to be used lukewarm from four to six times a day, and the eye afterward carefully and completely dried. No eye, in this state, he says, will bear more than the proportion of one gr. of the oxymuriate of quicksilver, and only seldom more than half a grain.

But, as soon as the suppurative period commences, attended with excoriations, gentle astringents, like the liquor plumbi subacetatis, in a solution of the lapis divinus (See *Lachrymal Organs*) should be added to the above lotion, for which they may at length be entirely substituted. And, when the suppurative period has terminated, but a morbid secretion of mucus yet obstinately continues, and threatens to become habitual, recourse should be had, without the least delay, to one of the following eyesalves, a bit of which, about the size of a small pea, Beer directs to be smeared once a day over the edges of the eyelids. ℞. Butyr. recentis insulsi ℥ss. Hydrargyri nitrico-oxydi gr. x. Tutiæ ptt. gr. vj. Misce. This ointment, he says, will sometimes answer; but, that it is mostly necessary to use Janin's salve, composed as follows: ℞. Butyri recentis insulsi ℥ss. Hydrargyri præcipitati albi. gr. xv. Boli albi ℈j. Misce.

According to Mr. Travers, the mild acute suppurative inflammation of the conjunctiva is not attended with that excessive swelling of the eyelids, that intense pain, nor that profuse secretion, with which the vehement acute form of the disease is characterized. In the treatment, he directs a solution of alum to be early substituted for emollient fomentations, which he recommends to be freely used during the acute period. Simple purging and abstinence, he says, are generally sufficient to allay the febrile irritation, which is moderate. Topical bleedings, and blisters, kept open on the back of the neck, are also stated to be of great efficacy. "When the pain and irritability to light subside, and the discharge becomes gleety, the conjunctiva pale and flaccid, tonics, especially the extract of bark and the acids, do great good." (*Synopsis, &c. p.* 264.)

Catarrhal ophthalmy, so called by Beer, is described by him as a species of glandular inflammation of the eyelids, attended with a simultaneous affection of the mucous membrane of the nose, trachea, &c. brought on by particular states of the weather, and attacking so many persons at once, as to appear epidemic. The prognosis and indications are the same as those in common glandular inflammation of the eyelids, with this exception, that attention must be paid to the affection of other organs, and both at the first and second periods of the second stage, such remedies given as operate powerfully on the mucous membranes and skin, and, in general, during the second stage, an equal warm temperature, and gentle diaphoretics, with camphor, are highly beneficial.

Severe Purulent Ophthalmy.—The *Blepharo-blenorrhœa*, and *Ophthalmo-blenorrhœa*, of Schmidt and Beer; including the *ophthalmia neonatorum;* the *Egyptian ophthalmy;* the *gonorrhœal ophthalmy, &c.*, on which varieties, however, I shall annex to this account some further particulars, as they relate to each of these cases individually, because, though the following history contains an excellent general description of the severe forms of suppurative inflammation of the conjunctiva, it leaves unexplained some of the circumstances on which its varieties depend.

The vehement acute suppurative inflammation of the conjunctiva is described by Mr. Travers as being sudden in its attack; a feature, in which it particularly differs from the milder cases usually met with in schools. (See *Lloyd on Scrofula, p.* 321.) It is accompanied with most severe darting pains; and the upper eyelid is sometimes in a few hours prolonged upon the cheek, owing to the infiltration and enormous swelling of the tissue, connecting the conjunctiva to the tarsus. (*Travers, Synopsis, &c. p.* 265.)

According to Beer, the modification of glandular inflammation of the eyelids, here to be considered, consists entirely in the rapid extension of the inflammation and suppuration, the disorder affecting, ere it is suspected, not only the whole of the conjunctiva of the eyelid, but also that of the eyeball, and the sclerotica and cornea. The swelling of the palpebral conjunctiva is described by Beer as being unusually great; at first, soft, somewhat elastic, smooth, and readily bleeding; but, afterward, in the second stage, hard and granulated, or, as another writer says, it "becomes preternaturally vascular, thickened, and scabrous, or forms fleshy eminences." (*Travers, Synopsis, &c. p.* 96.) The first stage is rapidly over. At the first period of the second stage, the secretion both of mucus and pus is surprisingly copious. First, the mucus is whitish and thin; but, as soon as the suppurative process begins, it becomes yellowish and thick, and when an attempt is made to open the eyelids, it gushes out with such force, and in so large a quantity, as frequently to cover, in an instant, the whole cheek. Sometimes, this mixture of mucus and matter contains light-coloured streaks of blood; but, in worse cases, these streaks are dark and brownish, or else a thin ichor is discharged, in which case, the progress of the disease is so rapid, that the eye can seldom be saved. The swelling of the conjunctiva of the eyelids, especially of that of the upper one, always increases during the first period of suppuration, and, when the discharge is more ichorous, the membrane is more granulated, so that if the eyelid be opened carelessly, or during the child's crying, fits of pain, &c. the whole tumefied conjunctiva of the upper eyelid is immediately thrown outward, in the form of ectropium, and it is sometimes difficult, and even impracticable to turn the part inward again, especially, when the conjunctiva is already changed into a hard sarcomatous substance. While the swelling at the inner surface of the eyelids continues to increase, their outer surface, particularly that of the upper one, becomes reddened; but the redness is dark-coloured, inclining to brown, and when the child cries, to blue. In children, the whole cheek on the affected side is very often swelled, and sometimes the mucous membrane of the lachrymal sac and even of the nose, participates in the effects of the disorder. Sometimes, at first, only one eye is affected, and the other is afterward attacked. And, according to Beer, just before the period of suppuration, it is by no means uncommon for rather a profuse bleeding to to take place from the eye; an event, which though it seriously alarm the parents of the child, or an adult patient, is hailed by the experienced surgeon as a favourable omen; for, in such cases, the suppuration is generally very mild, and not of a destructive kind, and the swelling of the conjunctiva of the eyelids, as well as that of the sclerotic conjunctiva, if already present, soon undergoes a remarkable diminution after such hemorrhage, which often recurs two or three times. When during the first, very short and transient stage, the inflammation extends also to the sclerotic conjunctiva, this membrane forms a pale-red, soft, irregular swelling, all round the cornea, which at length seems so buried, that at the period of the mucous secretion, its centre can hardly be discerned; and, when suppuration begins, both mucus and pus are discharged from the conjunctiva of the eyeball in profuse quantity, particularly accumulating over the cornea, and not unfrequently drying into a thick pellicle, when long detained in the eye. Hence, the case looks as if the whole eyeball, or at least, all the cornea, were in a state of complete suppuration. At length, the tumefied conjunctiva of the eyeball becomes sarcomatous, though never in such a degree as that of the eyelids. When the suppurative period ceases, and with it the most urgent danger to the eye, the secretion of mucus alone continues, as at the first period of the second stage, the swelling of the conjunctiva of the eyelids, and of the sclerotic conjunctiva, when this has also been affected, diminishes, and the disorder ends in an increased effusion of tears or true epiphora. When the effects of the suppuration upon the conjunctiva of the eyeball are more severe, the corneal production of this membrane in the most favourable cases is raised from the subjacent cornea, and so opaque, that the eyesight is lost, or at all events seriously impaired, until the transparency returns, which is sometimes late, especially when efficient treatment is not put in practice. Should the suppuration be very deep, the cornea, which always turns whiter and whiter, presents near the edge of the swelling of the conjunctiva an arrangement, similar to that of the leaves of an old book, and at length seems converted into a mass of purulent matter, which projects more and more out of the depression in the swelled conjunctiva, and then bursts in its centre either quickly, and with very violent pain, or slowly without any suffering, an oval hole being left, behind which the yet transparent crystalline lens appears, included in its undamaged capsule. At this period, adults can often see very plainly, and fancy their recovery near at hand, or, at least, all danger over. Already, however, every part of the cornea has been more or less perforated by ulceration, the iris protrudes through all these apertures, so as to form what has sometimes been named the staphyloma racemosum. In a very short time, not exceeding a few hours, the capsule of the lens is affected, and bursts like the cornea, when it is discharged either with, or without, a portion of the vitreous humour. At length, the suppuration subsides, and with it the protrusions of the iris, the opening in the cornea becoming closed with a brown, or bluish, opaque flat cicatrix. But, if in this destructive form of suppuration, nothing is done for the relief of the disease, the whole eyeball suppurates, the eyelids become concave instead of convex, and the fissure between them closes for ever. In adults of feeble constitutions, when the case is not properly treated, but particularly in weak children, this excessively violent form of conjunctival inflammation and suppuration spreads with such rapidity, that a considerable general disturbance of the system is occasioned. Indeed, according to Mr. Travers, in the common course of this vehement form of conjunctival suppurative ophthalmy, the system sympathizes; chilliness is succeeded by a hot and dry skin; and the pulse is frequent and hard. Yet, it is particularly pointed out by the army surgeons, that one peculiarity of the Egyptian purulent ophthalmy is its being generally attended with little constitutional disturbance. When the above-described annihilation of the eyeball takes place, it always creates violent general indisposition in unhealthy weak children, and even leaves adults for along while afterward in an impaired state of health.

According to Beer, who appears to have no idea of infection being concerned, the particular cause of this unfortunate extension of idiopathic glandular inflammation of the eyelids, both in infants and adults, frequently depends altogether upon the foul atmosphere, in which they are residing, and hence, says he, the disorder is, as it were, endemic in lying-in and foundling hospitals, where the air is much contaminated by effluvia, from the lochia, the crowding together of many uncleanly persons, dirty clouts, &c. The unjustifiable folly of exposing the eyes of new-born infants to every degree of light; a tedious labour, in which the child's head is detained a long while in the vagina; and roughly washing the eyes after birth with a coarse sponge; are other circumstances, supposed by Beer to be conducive to the origin of the complaint, in new-born infants. The reality of many of these causes I regard myself with a great deal of doubt; and as for his conjecture, that sprinkling cold water on the head in baptism, while in a state of perspiration, may produce the complaint, it is too absurd to need any serious refutation. The disorder, he says, is always more rapid and perilous in new-born infants than adults; (*B.* 1, *p.* 318,) a remark which does not agree with the statements usually made, if the Egyptian ophthalmy, as seen in the army, be comprehended. It is observed by Mr. Travers, that the highly contagious nature of the suppurative ophthalmia, whether in the mild, or vehement acute form, is sufficiently proved. For one person, affected with this disease above three months old, he thinks at least twenty are attacked under that age. "The mother is the subject of fluor albus, or gonorrhœa, and the discharge is usually perceived about the third day." (*Synopsis, &c. p.* 97.) Some further observations on the causes of some of these severe modifications of glandular inflammation of the eyelids will be introduced, after the prognosis and treatment have been considered. This will be the more necessary, as the propagation of the disorder by infection is here entirely overlooked.

According to Beer, whenever an idiopathic inflammation of the glands of the eyelids attains the severe forms, exhibited in the purulent ophthalmy of infants, the Egyptian ophthalmy, and gonorrhœal ophthalmy, the prognosis must naturally be unfavourable, and this in a greater degree, the more the inflammation and suppuration have extended to the eyeball itself. The cases are still more unpromising, when they happen in poor, half-starved, distressed individuals, whom it is impossible completely to extricate from the circumstances, which either cause, or have a pernicious effect upon the disease. Should an incidental ectropium not be immediately rectified, says Beer, it will continue until the end of the second stage, and even frequently longer, so as to require particular treatment. When at the period of suppuration, merely the layer of the conjunctiva, spread over the cornea, is destroyed, the prognosis, in respect to the complete recovery of the eyesight, is favourable, although it takes place but slowly. If the effects of the disease at this period should be deeper, yet the cornea not destroyed, only rendered flat and somewhat opaque; or, if the cornea should be ulcerated only at a very limited point; there will remain in the first case, an opacity of the cornea; but, in the second, a partial adhesion of the iris to the latter membrane (synechia anterior) is apt to follow, with a more or less extensive cicatrix on the cornea, covering in a greater or lesser degree the lessened and displaced pupil, and thus diminishing, or preventing vision. When, during the inflammation and suppuration, a considerable part, or the whole of the iris adheres to the cornea, and this is not penetrated by ulceration, the result, in the first case, is a *partial*, in the second, a *complete staphyloma* of the cornea, which does not fully develope itself, until towards the decline of the second stage of the ophthalmo-blennorrhœa. If the inflammation should spread to the textures of the eyeball itself, so as to produce severe constitutional disturbance, the eye wastes away in the midst of the profuse discharge, the eyelids sink inwards, and the fissure between them becomes permanently closed. (*Beer, B.* 1, *p.* 319.)

Beer notices the opinion of the celebrated Schmidt, which was, that the opthalmo-blennorrhœa, or purulent ophthalmy involving the sclerotic conjunctiva, always has a fixed duration of a month, in new-born infants, and of six, eight, or twelve weeks, in very weak individuals. Beer acknowledges the correctness of this opinion, only in cases where the surgeon has to deal with a completely formed ophthalmo-blennorrhœa, and not in a more recent case, or one in which the disease is chiefly confined to the inside of the eyelids. (*Blepharo-blennorrhœa.*) When the disorder is met with in the first period of the second stage, or it is confined to the palpebral conjunctiva and Meibomian glands, and truly idiopathic, Beer asserts, that its course may be restricted by efficient treatment to a few days, as he has often proved in the establishment for foundlings at Vienna.

It is further remarked by Beer, that, in this modification of genuine idiopathic glandular inflammation of the eyelids, the indications have something peculiar in them. If, by chance, the surgeon meet with the disease in its first stage, it will be most benefited by the application of folded linen wet with cold water; and sometimes a brisk purge of jalap and calomel, and putting a leech over the lachrymal sac at the inner canthus, will promote the subsidence of this dangerous species of ophthalmy. The case, however, rarely presents itself for medical treatment thus early, and, *in hospitals*, Beer says, *antiphlogistic treatment is, on this account, hardly ever indicated.*

With some exceptions of importance, the treatment, advised by Beer, for the second stage of these severer forms of purulent ophthalmy, resembles that proposed by him for the second stage of simple glandular inflammation of the eyelids, or the milder varieties. These more severe kinds of purulent inflammation of the eye, implied by blepharo-blennorrhœa and ophthalmo-blennorrhœa, he says, should never be viewed and treated merely as local disorders; but that, both in children and adults, internal remedies should be exhibited, particularly volatile tonic medicines. In cases, where the cornea is already attacked by a destructive ulcerative process, manifold experience has convinced him, that bark, combined with naphtha, and the tincture of opium, is the only means of saving the eye; but, that if the suppuration be confined to the eyelids, the decoction of calamus aromaticus with naphtha and opium will mostly answer. When, on the supervention of suppuration, the pain in the eye and neighbouring parts is excessively severe, Beer assures us, that friction with a liniment of opium will give great relief. In new-born infants, the maternal milk of right quality will mostly do more good, than internal medicines: but if the case be very urgent, and the child feeble, Beer thinks volatile medicines may sometimes do good.

With respect to particularities made necessary in the local treatment by the modified nature of the inflammation, Beer offers the following information. First, in new-born infants, or very young children, the oxymuriate of mercury cannot be used without danger, though blunted with mucilage; and even in adults, it should be employed in these cases with great circumspection. Secondly, the mucus and purulent matter should not be allowed to remain long under the eyelids, as such lodgment is found to promote the destruction of the layer of the conjunctiva situated on the cornea; but, at the same time, Beer thinks, that leaving any water on the eyes, after cleaning them, and letting it become cold there, will have quite as pernicious an effect. Hence, he is very particular in directing all the mucus and purulent matter to be wiped away from the eye with a bit of fine sponge moistened with a warm mucilaginous collyrium, but not so wet as to let the fluid drop out of it; or when they are very copious, and in large flakes, he even recommends them to be washed away by means of Anel's syringe; but, he says, that every part about the eye should be immediately afterward well dried with a warm napkin, and then covered with a warm camphorated compress. Thirdly, during the suppurative period, according to Beer, common tincture of opium, or the vinous tincture is the best local application, the parts being smeared with it twice a day, by means of a fine camel-hair brush. It is only in a few instances, that a small proportion of the lapsis divinus (see *Lachrymal Organs,*) mixed with the mucilaginous collyrium, can be endured. Beer declares, that he has never seen any good produced by Bates's camphorated lotion, which was so highly praised by the late Mr. Ware. Fourthly, when the suppurative period has terminated, the mucous secretion again becomes white and thin, as at the very commencement of the second stage, but it is always more copious; now is the time, (as in the last stage of simple glandular inflammation of the eyelids) when the topical use of mercury, joined with styptics, especially in the form of an eye-salve, is indicated. Fifthly, if an eversion of the upper eyelid should happen from washing the eye carelessly, or the mere crying of the infant, in consequence of the thickened granulated state of the palpebral conjunctiva, the position of the eyelid must, if possible, be immediately rectified; for afterward, this cannot be done. In order to avoid this ectropium, the eyelids should never be opened while the child is crying, or in any way agitated; for, at such periods, the thickened scabrous conjunctiva will suddenly protrude, and cannot be kept back. Beer says, that the eyelid should be replaced in the manner directed by Schmidt. (*Ophthalmol. Bibl.* 3. *B.* 2, *Stuck*, *p.* 149.) The surgeon having smeared the ends of the thumb and forefinger of each of his hands with fresh butter, is to take hold of the everted cartilage of the eyelid at the outer and inner canthus, draw it slowly a little upwards, and then suddenly downwards. Thus, the thickened conjunctiva, if not too fleshy and granulated, may be quickly reduced, and the ectropium removed. But, if the swelling of this membrane should be already very considerable, and have begun to be hard and studded with excrescences, the thumbs should be placed so as to compress rather the middle of the eyelid. However, if the ectropium cannot be at once removed, it is to be treated, after the termination of the second stage of the purulent ophthalmy, as a sequel of this disorder. (See *Ectropium*.)

In the ophthalmo-blennorrhœa the alteration of the sclerotic conjunctiva is said by Beer to be very different from chemosis; a remark, which is strictly correct, inasmuch as ordinary chemosis is not attended with that change in the surface of the sclerotic conjunctiva, which fits it for the secretion of pus. But, if we are to understand by chemosis, a copious effusion of lymph in the loose cellular substance between the conjunctiva and the eyeball, this state must be admitted as one of the usual effects of severe purulent ophthalmy.

"It is after this morbid condition, which is characteristic of the suppurative ophthalmia (says Mr. Travers) that the conjunctiva forms fungous excrescences, pendulous flaps, or hard callous rolls protruding between the palpebræ and globe, and everting the former, or, if not protruding, causing the turning of the lid over against the globe. The tarsal portion takes on from the same cause the hard granulated surface, which keeps up incessant irritation of the sclerotic conjunctiva, and at length renders the cornea opaque." (*Synopsis, &c. p.* 98.)

The treatment recommended by Mr. Travers for the vehement acute suppurative inflammation of the conjunctiva consists in a very copious venesection, by which, he says, the pain is mitigated, if not removed; the pulse softened; and the patient sinks into a sound sleep and perspires freely. The high scarlet hue and bulk of the chemosis are sensibly reduced, and the cornea is brighter. The blood-letting, if necessary, is to be repeated, and the patient briskly purged, every dose of the opening medicine being followed by a tea-spoonful of a solution of emetic tartar, so as to keep up a state of nausea, perspiration, and faintness. When the discharge becomes thin, gleety, and more abundant, the swelling of the eyelid subsides, the conjunctiva sinks and becomes pale and flabby, the pain and febrile irritation are past, and the cornea retains its tone and brightness, Mr. Travers considers the case safe, and states, that the prompt exhibition of tonics, with the use of cooling astringent lotions, will prevent its lapsing into a chronic form. "But if, when the lowering practice has been pushed to the extent of arresting acute inflammation, the patient being at the same time sunk and exhausted, the cornea shows a lack lustre and raggedness of its whole surface, as if shrunk by immersion in an acid, or a gray patch in the centre, or a line encircling, or half encircling its base, assuming a similar appearance, the portion so marked out will infallibly be detached by a rapid slough, unless by a successful rally of the patient's powers, we can set up the adhesive inflammation, so as to preserve *in situ* that which may remain transparent." (*Synopsis, &c. p.* 266.) Here we find some approximation of practice, between Mr. Travers and Professor Beer; but it is almost the only point, in which any resemblance can be found in their modes of treatment.

The granulated, or fungous state of the palpebral conjunctiva, produced by purulent ophthalmy, sometimes demands particular treatment, after the original disease is subdued. If such state of the eyelid be not rectified, it often keeps up a "gleety discharge, irritability to light, drooping of the upper lid, a pricking sensation as of sand in the eye, and a preternaturally irritable and vascular state of the sclerotic conjunctiva; with these are frequently combined opacities of the cornea." (*Travers, op. cit. p.* 271.) The affection, as conjoined with opaque cornea, is particularly noticed by Dr. Vetch, who describes the disease of the palpebræ as consisting, at first, in a highly villous state of their membranous lining, which, if not treated by appropriate remedies, gives birth to granulations, which in process of time become more deeply sulcated, hard, or warty. Along with the villous and fleshy appearance of the lining of the eyelids, there is a general oozing of purulent matter, which may at any time be squeezed out by pressing the finger on the part. The diseased structure is highly vascular, and bleeds most profusely when cut. It possesses, as all granulated surfaces do, a very great power of growth or reproduction. Dr. Vetch has seen many cases in which it has been removed with more zeal than discretion, twenty or thirty times successively, without this disposition to reproduction having suffered any diminution. Indeed, he assures us, that the operation was very unfavourable to the ultimate recovery of the part; "a new surface is produced of a bright velvety appearance, much less susceptible of cure than the original disease, and which, even if at length healed, does not assume the natural appearance of the part, but that of a cicatrized surface," not attended with a return of the transparency of the cornea. It is satisfactorily proved, by the observations of Dr. Vetch, that this diseased state of the inner surface of the eyelid was not only known to

Rhases, and other old practitioners, under the names of sycosis, trachoma, scabies palpebrarum, &c. but that its treatment by the actual cautery, excision, and friction, was also recommended by them. The honour of having introduced the preferable mode of cure with escharotics, Dr. Vetch assigns to St. Ives. No substances appear to Dr. Vetch more effectual for this purpose than the sulphate of copper and nitrate of silver. He says, that they should be pointed in the form of a pencil, and fixed in a port-crayon. They are to be applied, not as some have conceived, with the view of producing a slough over the whole surface, but with great delicacy, and in so many points only, as will produce a gradual change in the condition and disposition of the part. As long as any purulency remains, Dr. Vetch states, that the above applications will be much aided by the daily use of the liquor plumbi subacetatis. When the disease resists these remedies, and the surface is hard and warty, he applies very minute quantities of finely levigated powder of verdigris, or burnt alum, to the everted surface, with a fine camel-hair pencil, but carefully washes them off with a syringe before the eyelid is returned. The caustic potassa, lightly applied to the more prominent parts of the diseased surface, will also answer. (See *Vetch on Diseases of the Eye. p.* 73, *&c.*) Mr. Lloyd also gives his testimony in favour of the superiority of the nitrate of silver, which he has employed in the form of a saturated solution for restoring the healthy state of the inner surface of the eyelid. (*On Scrofula, p.* 328.) Others, however, still adhere to the practice of excision, which, as already observed, was followed by the ancients, and revived of late years in England by Mr. Saunders, who did with scissors what Sir W. Adams and others have subsequently performed with a knife or lancet. Mr. Travers, I may observe, is also one of the advocates for the excision of the granulations and hardened excrescences of the conjunctiva. If there be a nebula of the cornea, with a plexus of vessels extending to it, these are then divided, near the edge of the cornea, in the manner recommended by Scarpa. Mr. Travers afterward applies a solution of the sulphate of copper, the liquor plumbi subacetatis, or the vinous tincture of opium. One remark which he makes tends very much to confirm the general advantage of the practice inculcated by Dr. Vetch; for, it is observed, "the application of the bluestone, or of the lunar caustic, is often useful in preventing the regeneration of the granulations after their excision." (*Synopsis, &c. p.* 272.) My friend, Mr. Lawrence, whose experience in diseases of the eye is very considerable, lately informed me, that he finds caustic the sure mode of permanently removing the granulated fungous state of the inner surface of the eyelid, and that, when the granulations are cut away, they are frequently reproduced; a fact on which Dr. Vetch has particularly insisted.

Egyptian Ophthalmy. One of the best accounts of this disease, as it appeared in the army, is that delivered by Dr. Vetch. Although there can be no doubt that the disorder, in all its general characters, closely corresponds to the severe form of acute suppurative inflammation of the conjunctiva, as described by Beer; yet there are some peculiarities with which it appears to have been characterized. Thus, one thing noticed in the Egyptian ophthalmy, but not in other purulent ophthalmies, is, that *the first appearance of inflammation was observable in* the lining of *the lower eyelid.* (*Peach, in Edinb. Med. and Surgical Journ. for January,* 1807. *Vetch, on Diseases of the Eye, p.* 196.) According to the latter writer, the feeling of dirt, or sand, rolling in the eye is a symptom requiring particular attention, as its accession is a certain index of the disease being on the increase. It is subject to exacerbations and remissions, the attacks always taking place in the evening, or very early in the morning. *The first stage of the disease* is said by Dr. Vetch to be *characterized by its great and uniform redness, without that pain, tension, or intolerance of light, which accompanies most other forms of ocular inflammation;* and, in particular, that in which the sclerotic coat is affected. From the very beginning of the complaint, there is a disposition to puffiness in the cellular texture between the conjunctiva and the globe of the eye, often suddenly swelling out into a state of complete chemosis, and at other times making a more gradual approach to the cornea. While effusion is thus taking place upon the eye, œdema is likewise going on beneath the integuments of the eyelids. This enormous tumefaction of the eyelids is said to be generally consentaneous with the complete formation of chemosis; entropium is produced, and the integuments of the two eyelids meet, leaving a deep sulcus between them. When the external swelling begins, the discharge, which was previously moderate, and consisted of pus floating in a watery fluid, changes into a continued stream of yellow matter, which, diluted with the lachrymal secretion, greatly exceeds in quantity that derived from any gonorrhœa. Although, says Dr. Vetch, the tumefaction may be, at first, farther advanced in one eye than the other, it generally reaches its greatest height in both about the same. The patient now begins to suffer attacks of excruciating pain in the eye; a certain indication of the extension of the mischief. "An occasional sensation, as if needles were thrust into the eye, accompanied with fulness and throbbing of the temples, often precedes the deeper seated pain." This last is often of an intermitting nature, and a period of excruciating torture is succeeded by an interval of perfect ease. Sometimes the pain shifts instantaneously from one eye to the other, and is seldom or never equally severe in both at the same time; and sometimes, instead of being in the eye, it occurs in a circumscribed spot of the head, which the patient describes by saying, he can cover the part with his finger. Sooner or later, one of these attacks of pain is terminated by a sensation of rupture of the cornea, with a gush of scalding water, succeeded by immediate relief to the eye in which this event has happened, but generally soon followed by an increased violence of the symptoms in the other. At length the attacks of pain become shorter, and less severe, though they do not cease altogether till after the lapse of many weeks, and even months. *During this stage of the disease*, according to Dr. Vetch, *there is seldom the slightest alteration of the pulse, unless the lancet have been freely employed*. The patient's general health is little impaired, his appetite continues natural, but sleep almost totally forsakes him.

As the pain abates, the external tumefaction also subsides, and a gaping appearance of the eyelids succeeds, their edges, instead of being inverted, now becoming everted. This is what Dr Vetch designates as the third stage of the disease.

After the swelling of the second stage has subsided, the eyelids are prevented from returning to their natural state by the granulated change of the conjunctiva which lines them; and an eversion of them now occurs in a greater or lesser degree. (*Vetch on Diseases of the Eye*, *p*. 196, 202.) Among other interesting remarks, made by the same author, he states, that there is no reason to warrant the idea that the ulceration ever proceeds from within outwards. He observes, that, when any large portion of the cornea sloughs, an adventitious and vascular membrane is often produced, which finally forms a staphyloma. "In some few cases, (says he) I have seen the lens and its capsule exposed, without any external covering whatever, and, for a short time, the patient saw every thing with wonderful accuracy; but, as soon as the capsule gives way, the lens, and more or less of the vitreous humour, escape, the eye shrinks, and the cornea contracts into a small horn-coloured speck." This total destruction of the globe of the eye is said generally to ensure the other, and renders it less liable to be affected by future attacks of inflammation.

A few years ago, an ophthalmy, supposed to be of the same nature as the Egyptian, though milder, like that which has generally been observed in schools, occurred to a great extent in the Royal Military Asylum at Chelsea, and Mr. M'Gregor, the surgeon of that institution, has favoured the public with an excellent description of the disease, and some highly interesting facts and reflections upon the subject. In the Military Asylum the symptoms of this species of ophthalmy generally made their appearance in the following order: "A considerable degree of itching was first felt in the evening; this was succeeded by a sticking together of the eyelids, principally complained of by the patient on waking in the morning. The eyelids appeared fuller externally than they naturally are; and on examining their internal surface this was found inflamed. The sebaceous glands of the tarsi were considerably enlarged, and of a redder colour than usual. The caruncula lachrymalis had a similar appearance.

"In 24 or 30 hours after the appearance of the above-mentioned symptoms, a viscid mucous discharge took place from the internal surface of each eyelid, and lodged at the inner canthus, till the quantity was sufficient to be pressed over the cheek by the motions of the eye. The vessels of the tunica conjunctiva, covering the eyeball, were distended with red blood, and the tunica conjunctiva was generally so thickened, and raised, as to form an elevated border round the transparent cornea. This state was often accompanied with redness of the skin round the eye, which sometimes extended to a considerable distance, and resembled, in colour and form, very much what takes place in the cow-pox pustule, between the 9th and 12th days after inoculation.

"When the purulent discharge was considerable, there was a swelling of the external eyelids, which often prevented the patient from opening them for several days. The discharge also frequently excoriated the cheeks as it trickled down. Exposure to light caused pain. When light was excluded, and the eye kept from motion, pain was seldom much complained of.

"These symptoms, in many, subsided, without much aid from medicine, in 10, 12, or 14 days, leaving the eye for a considerable time in an irritable state. In several, however, the disease continued for a much longer time, and ulceration took place on the internal surface of the eyelids, and in different parts on the eyeball. If one of those small ulcers happened to be situated on the transparent cornea, it generally, on healing, left a white speck, which, however, in the young subjects under our care, was commonly soon removed. In some few instances, an abscess took place in the substance of the eyeball, which, bursting externally, produced irrecoverable blindness." (*P. M'Gregor, in Trans. of a Society for the Improvement of Med. and Chirurg. Knowledge, Vol.* 3, *p*. 38—40.)

When the local symptoms had prevailed two or three days, some febrile disturbance occurred; but, except in severe cases, it was scarcely observable.

Mr. M'Gregor considered this ophthalmy to be of the same nature as that which has raged with such violence in the army at different periods, since the return of our troops from Egypt in 1800, 1801, and 1802. However, he has found that its consequences have not been so injurious to children as to adults; for, out of the great number of children that were afflicted with the disease at the Military Asylum, only six lost the sight of both eyes, and twelve the sight of one eye. (*Op. cit. p*. 49.) On the other hand, Dr. Vetch informs us, that, in the second battalion of the 52d regiment, which consisted of somewhat more than 700 men, 636 cases of ophthalmy were admitted into the hospital between August, 1805, and August, 1806; and that, "of this number, fifty were dismissed with the loss of both eyes, and forty with that of one." And, as Mr. M'Gregor observes, it is a melancholy fact, as appears from the returns of Chelsea and Kilmainham Hospitals, that 2317 soldiers were, on the 1st of December, 1810, a burthen upon the public from blindness, in consequence of ophthalmy. The cases, in which only one eye was lost, are not here included.

The attacks of the disease appear to be much more frequent, severe, and obstinate, in hot, sultry weather, than in cold or temperate seasons. (*P. M'Gregor, op. cit. p.* 37, 64, *&c.*)

This gentleman also observed, that the ophthalmy was more severe and protracted in persons having red hair, or a scrofulous habit, than in others. The right eye was more frequently and violently affected than the left. In females the symptoms are greatly aggravated for some days previous to the catamenia; but, on this evacuation taking place, they are quickly lessened. Mr. M'Gregor further remarks, that the measles, cow-pox, and mumps, go through their course as regularly in persons affected with this species of ophthalmy, as when no other disease is present; a circumstance which, with some others, proves that the disorder is entirely local. (*P.* 54, 55.)

With respect to the causes of the *Egyptian Purulent Ophthalmy,* much difference of opinion has prevailed, and, indeed, there was a time when the disease was regarded by the majority of army surgeons, who alone had opportunities of judging of it, as not being in reality *contagious*, but *dependent upon local epidemic causes; the irritation of sand; peculiarity of climate, &c.* The late Mr. Ware even doubted the propriety of calling this ophthalmy *Egyptian*, and he contended that a disease precisely similar in its symptoms and progress had been noticed long ago in this and other countries; and that, in Egypt, several varieties of ophthalmy prevail. He preferred calling the disease the *Epidemical Purulent Ophthalmy.* On the other hand, Sir W. Adams conceives, that it ought rather to be called *Asiatic Ophthalmy*, as recent investigations prove that it prevails in the greater part of Asia, and was long ago described by Avicenna. (*Graefe, Journ. der Chir* 1 B. *p.* 170.)

That there has been long known in this country an infectious species of purulent ophthalmy cannot be doubted. The case, described by many surgeons, as proceeding from the sudden stoppage of gonorrhœa, or the inadvertent application of gonorrhæal matter to the eyes, which disorder will be presently noticed, is certainly an infectious purulent ophthalmy. It is also admitted, that it resembles Egyptian ophthalmy, by the intensity and rapidity of its symptoms; but the latter case is strongly characterized by the quickness with which it causes, especially in adults, opacities or ulcerations of the cornea; the long continued irritability of the eyes after the subsidence of inflammation; but, more particularly, its very *infectious* nature, by which it spreads to an extent, *that has never been observed with regard to any other species of purulent ophthalmy.* There have been epidemic ophthalmies of other kinds, which have been known to affect the greater part of the population of certain districts and towns in England. The celebrated ophthalmy, which happened at Newbury, in Berks. some years ago, is an instance, that must be known to every body. But I know of no *purulent* inflammation of the eyes, which ever spread to a great extent in England, before the return of our troops from Egypt.

The reflections and observations of Mr. M'Gregor, as well as those of Dr. Vetch, and Dr. Edmondstone, I think, leave no doubt of two facts: first, that this ophthalmy was at all events brought from Egypt; and secondly, that it is infectious, *but only capable of being communicated from one person to another by actual contact of the discharge.* "If (says Dr. Vetch) any belief were entertained by the officers of the British army, during the first expedition to Egypt, that the disease was contagious, it was of a nature very vague and indefinite. Combined as its operations necessarily must be in that country *with other exciting causes*, there would be more difficulty in the first recognition of the fact. But, the continuance of the complaint with the troops, after their departure from the country, could scarcely fail to lead to the obvious conclusion of its possessing a power of propagation. Before the disease reached this country, the opinion of its being contagious was adopted by many. *Dr. Edmondstone*, in the account which he published of the disease, as it appeared in the regiment, to which he was surgeon, after its return to England, *first made the public acquainted with the fact of the disease being communicable.* In an account of the Egyptian ophthalmia, as it appeared in this country, printed in the early part of 1807, *I first established, that the communication of the disease was exclusively produced by the application of the discharge from the eyes of the diseased to those of the healthy.*" (*Vetch on Diseases of the Eye, p.* 178.)

The opinion that the disease is ever communicated from one person to another, through the medium of the atmosphere, is at present nearly abandoned. During the whole time that Dr. Vetch had the management of the ophthalmic hospitals, there never was an instance of any medical officer contracting the disease, although exposed to what might be supposed to be the greatest concentration of any contagion that could arise in the worst stage of the complaint. Two orderlies only contracted the disease, and both in consequence of the accidental application of the virus. However, Sir W. Adams maintains, that he has seen many cases which prove, that the disorder, like small-pox, may spread contagiously, without any kind of inoculation. (See *Graefe's Journ. B.* 1. *p.* 174.) That the disease may also be partly propagated by epidemic causes in certain places, I think as certain and clear, as that there must be a cause for the first commencement of the disorder in situations where infection by contact is out of the question. And, as Dr. Vetch has observed, "from whatever cause inflammation of the conjunctiva may originate, when the action is of that nature, or degree of violence as to produce a puriform or purulent discharge; the discharge, so produced, operates as an animal virus, when applied to the conjunctiva of a healthy eye. Considering the various modes, by which such a contact must inevitably occur in the usual relations of life, it must be obvious, that wherever ophthalmia prevails, whether it be the effect of local conditions of the soil, or of the atmosphere, naturally or artificially produced, this contagious effect must sooner or later mix, or unite its operation with that of the more general and original one; and hence, without regard to this property of the disease, its occurrence must often remain inexplicable, and at variance with the more general cause existing in external circumstances, And further, as the disease, produced by infection, is of a nature more violent and malignant, than that produced by the impression of atmospheric causes, it will, in every instance of extensively prevailing ophthalmia, occasion two different forms of disease, which, as long as they are considered as one and the same, will produce, according as the one or the other predominates, very discordant results." (*Vetch on Diseases of the Eye*, *p*. 175.)

Mr. M'Gregor relates three cases, which prove, that the matter, after its application, produces its effects in a very short time. I shall only cite the following example:—On the 21st of October, 1809, about four o'clock, P. M. Nurse Flannelly, while syringing the eyes of a boy, let some of the lotion, which had already washed the diseased eyes, pass out of the syringe into her own right eye. She felt little or no smarting at the time; but, towards nine o'clock the same evening, her right eye became red, and somewhat painful, and when she awoke next morning, her eyelids were swelled, there was a purulent discharge, pain, &c. (*Op. cit*, *p*. 51.)

The late Mr. Ware, though he admitted, that the infection was brought into this country from Egypt by the troops, conceived that the same disease also sometimes arose from the matter of gonorrhœa being applied to the eyes, and that it had been prevalent in this country before the return of the army from Egypt. He thought, however, that the infection was generally communicated by contact. Mr. Ware observes, some of the worst cases of the purulent ophthalmy of children have happened in those whose mothers were subject to an acrimonious discharge from the vagina at the time of parturition. Some of the worst forms of the purulent ophthalmy in adults have occurred in those, who, either shortly before the attack of the ophthalmy, or at that very time, laboured either under a gonorrhœa, or a gleet. Mr. Ware does not mean to impute every purulent ophthalmy to such a cause; but, in the majority of adults, whom he has seen affected, if the disorder had not been produced by the applicaton of morbid matter, from a diseased eye, it could be traced to a connexion between the ophthalmy and disease of the urethra. Other causes, Mr. Ware acknowledges, may contribute to aggravate, and perhaps produce the disorder, and the purulent ophthalmy in Egypt has been attributed to a great number. The combined influence of heat and light, of a burning dust continually raised by the wind, and of the heavy dews of the night, may powerfully tend to excite inflammations of the eyes. Yet something more must operate in causing the malignant ophthalmy now under consideration; for the same causes operate with equal violence in some other countries, besides Egypt, and yet do not produce the same effect; and, in this country (says Mr. Ware) the disorder prevailed during the last summer, to as great a degree, and upon as great a number of persons within a small district of less than a mile, as it ever did in Egypt; and yet, beyond this space, on either side, scarcely a person was affected with it! The disorder was certainly brought into this country by the soldiers who returned from Egypt, and was probably communicated from them to many others. Now, as the action of the atmosphere alone cannot account for the spreading of the disease, &c. Mr. Ware is led to believe, that this particular disorder is only communicable by absolute contact; that is, by the application of some part of the discharge, which issues, either from the conjunctiva of an affected eye, or from some other membrane secreting a similar poison, to the conjunctiva of the eye of another person. In schools and nurseries, in consequence of children using the same basins and towels, as others who had the complaint, the disease has been communicated to nearly twenty in one academy. Hence, Mr. Ware censures the indiscriminate use of those articles, in schools, nurseries, hospitals, ships, and barracks. (*P*. 14, 15.)

That in Egypt the origin of the disease cannot rightly be imputed to the effect of the sand and hot winds of the country, is clearly proved; 1st. Because, if this were the case, the disease would not be most prevalent in the autumnal season, during the inundation of the Nile. 2dly, The inhabitants of the Delta would not be more subject to it, than the Bedouin Arabs, who live on the sands of the desert. Not only the Bedouin Arabs, says Dr. Vetch, remain free from the disease, but Europeans, *who are not particularly exposed to the night air, are also safe from its attacks.* "The nature of military duty prevented our soldiers from using this precaution, and in a particular manner they became victims to the complaint. The men suffered more in proportion to the officers of the English army; as the latter enjoyed a better, though often an incomplete defence from the coldness and dampness of the night; and officers, employed in strictly military duty, suffered more than those attached to the civil departments." (*Vetch on Diseases of the Eyes, p.* 157.) And Assalini remarks, that if the dust or sand were the sole cause of ophthalmia, we ought to be exempted from the disease, where the cause does not exist. The contrary, however, was the case in the Delta, and principally on the cultivated borders of the Nile, during its inundations. *When we were exposed to the air during the night, we were immediately attacked with ophthalmia*, though the dust and sand were then under water. Larrey also imputes the origin of the disease to the cold damp nocturnal air, after the great heats of the day. (*Graefe's Journ. B.*1, *p.* 179.)

Whoever reads the account of the Egyptian ophthalmia, as given by Mr. M'Gregor and Dr. Vetch, will be convinced that the disorder is only communicable from one person to another by the application of the infectious matter to the eyes. Probably, the common mode of propagation is the inadvertent use of the same towels, or even merely touching the same articles, which have been in the hands of infected persons, who must be supposed occasionally to apply their fingers more or less to the eyelids. In this last way, the commencement of the disease may be accounted for in regiments upon their entering into barracks, which have been quitted by other infected soldiers. "Flies, in warm weather, (says Mr. M'Gregor) are seen in great numbers surrounding patients labouring under ophthalmia; and I much suspect are very frequently the medium by which the disease is communicated." (*P.* 54.) The matter is observed to be most infectious, when the disease is in an acute state.

Dr. Vetch adverts to two important questions connected with the history of the Egyptian ophthalmy. The first relates to the length of time which the disease has, at different periods, lain dormant, and especially between the return of the troops from Egypt, and the breaking out of the disease in the 52d regiment. An explanation of this fact is attempted by supposing, that the complaint exists, and is liable to a renewal of its infectious quality, long after the eye seems to have recovered its natural and healthy appearance. Perhaps, it would be as well to be content with the fact, that, in crowded barracks, under particular circumstances, soldiers, who have once had the disease, are very liable to relapses. The other question is, why has the disease produced such ravage in the army in England, and not in that of France? It is well known, that the French soldiers in Egypt suffered as much as our own troops from the affection, and great numbers of them returned to France with the disease in a chronic form. "In many (says M. Roux) the influence of their native climate has sufficed for the removal of all vestige of the disorder. On the contrary, in others, it has continued in a chronic state, either attended with the loss of one, or of both eyes; and many of our invalids remain with the affliction. But, it has not been found, that these soldiers, who returned from Egypt, have ever communicated a contagious ophthalmia, either in regiments, in which many of them have been incorporated; or in invalid houses, where others have obtained their retirement; or in the individuals belonging to the different classes of society. Such is the objection that has been made, and may always be again urged, against the opinions and observations of the English, respecting the Egyptian ophthalmy." (*Roux, Voyage faite à Londres en* 1814, *ou Parallèle de la Chir. Angloise, &c. p.* 49.)

Baron Larrey, who admits that the disease may be communicated by application of the matter, argues, that it is not contagious in any other way, because, in Egypt, for want of sufficient hospital room, patients with this and other diseases were mixed together, without the ophthalmia being propagated to any of the patients, who were careful to avoid the above mode of infection. (*Graefe's Journ. B.* 1, *p.* 179.) Larrey, however, need not have used this reasoning with us, because it is a mistake in him to suppose, that the disease is here commonly regarded as communicable through the medium of the atmosphere. While, however, English surgeons chiefly explain the extension of the disease by the infectious nature of the discharge when applied to the eyelids, and Larrey admits that the matter is thus infectious, the latter, as well as Roux, assures us, that none of the healthy soldiers, who came home with the blind invalids from Egypt, were attacked with this species of ophthalmy. A great number of those invalids were received in the hospital of the guards at Paris, and treated there without any of the other patients being infected. (*Graefe's Journ. loc. cit.*) On my return from the Mediterranean through France in 1802, I saw many of the French troops in a town between Marseilles and Lyons, with bad eyes, contracted in Egypt, associating with other soldiers, whose eyes were perfectly healthy, and living in the same barracks; a proof, that the French soldiers, with the exception of climate, or some other protecting cause, were placed apparently in circumstances, in which the disease here made such extensive ravages. This is a point which I humbly conceive, is not at all solved by Dr. Vetch's belief, that the difference is explicable by the French troops being sent into the field; for, in fact, the soldiers with diseased eyes were in barracks, or hospitals, as well as our own troops.

But, notwithstanding it seems proved, that the discharge from the eyes in the Egyptian ophthalmy is so actively infectious in England, it appears from an experiment, made by Mr. Mackesy, that its application may sometimes be made to a healthy eye, without the disease following as a matter of certainty.

This gentleman, who was surgeon to the 62d regiment, applied to his own eyes linen impregnated with matter discharged from the eyes of patients in the fully formed stage of the disease, and even allowed some of the matter to pass under the eyelids; yet the complaint was not communicated. (See *Edinb. Med. and Surg. Journ. Vol.* 12, *p.* 411.)

One of the most material circumstances in which the practice of English surgeons differs from that of foreign practitioners in cases of severe purulent, and especially Egyptian ophthalmy, is the freedom and boldness, with which the former attack the disease in its first stage. Mr. Peach recommends taking away at once as much as 60 ounces of blood; (*Edinb. Med. and Surg. Journ. for January*, 1807) and Dr. Vetch lays great stress on the striking benefit of bleeding the patient till syncope is produced. "When inflammation has its seat in the sclerotic coat, (says this gentleman) general blood-letting may for the most part be dispensed with, and even when employed to the greatest extent, the same benefit does not ensue. In the purulent inflammation of the conjunctiva, however, although some good may be derived from depletion, yet a perfect command over the disease depends less on lowering the system, than on the temporary cessation of arterial action by syncope, which it becomes the object of the operation to produce. This practice, besides its efficacy, will accomplish the cure with a much less expenditure of blood, than is occasioned by the repeated bleedings generally had recourse to, where this method of rendering one equal to the cure of the complaint has been neglected. Some time before the approach of faintness, the redness of the conjunctiva for the most part disappears; but this is no security against the return of the disease, if the flow of blood be stopped, without deliquium animi succeeding." (*Vetch on Diseases of the Eye*, *p.* 206.) The attacks of a painful sensation, as if gravel were in the eye, are considered by this gentleman as a proof of the disease increasing, and are regarded by him, in the early stage of the disease, as a better indication of the necessity for bleeding, than the appearance of the eye itself.

With respect to applications, Dr. Vetch speaks very highly of the beneficial effects produced in the beginning of the case by dropping into the eye the undiluted liquor plumbi subacetatis, which, he says, diminishes the discharge, lessens the inflammation, and is incapable of doing harm in any stage of the disease. He places great confidence in the salutary results of a free exposure of the eye to the atmosphere; and speaks in high terms of the good derived from applying at night to the eye an infusion of tobacco, two drachms of the leaves to eight ounces of water. "It possesses (says Dr. Vetch) the valuable properties of acting as a powerful astringent, restraining the purulent discharge, and diminishing the œdema, or external swelling of the palpebræ; at the same time, that its narcotic qualities often relieve the pain and the perpetual watchfulness, which the largest doses of opium cannot subdue." (*P.* 211.) Bleeding, however, is the "sheet anchor," and the only means of preventing the destruction of the cornea, whenever attacks of pain in the eye, or orbit, denote the unsubdued state of the disease. (*P.* 212.) When the disease shifts its violence from one eye to the other, and is of long duration, Dr Vetch recommends cupping, and the eye to be more carefully cleaned by the injection of tepid water, or any gentle astringent lotion, and afterward wiped dry. When the discharge continues acrid and scalding, he directs blisters to be applied to the nape of the neck, and behind the ears. He wishes it to be distinctly kept in mind, that the time for the employment of bleeding, with the view of saving the eye, is during the first stage, or early part of the second; and when ulceration of the cornea has commenced, the case is to be treated on the principles applicable to sclerotic inflammation.

With regard to the plan of diminishing inflammatory action by medicines which excite nausea and sickness, instead of having recourse to the lancet, Dr Vetch states, that, in soldiers, it does not answer so well, and in the end proves more debilitating.

As soon as the external œdema of the eyelids subsides, and they begin to be everted, Dr. Vetch begins the cure of the granulations and general villosity, by a very light and careful application of the argentum nitratum. The everted portion is then to be returned, and secured in its place with a compress and bandage. This method is to be repeated every time the eye is cleaned, and, in the course of a fortnight, the tendency to ectropium will be removed. (*P.* 229.)

Assalini found venesection, all emollient applications, and eyewaters, hurtful. He first purged his patients, and then introduced into their eyes a few drops of a solution of the lapis divinus, (see *Lachrymal Organs*,) to which was sometimes added a small quantity of the acetate of lead. He speaks favourably of leeches, and sometimes he put a small blister on the temple, or behind the ears. (See *Manuale di Chirurgia*; *Milano*, 1812.)

Perhaps the best mode of putting an immediate stop to the Egyptian ophthalmy, when it prevails extensively in a regiment in garrison, or barracks, is to put the men actually affected into a detached hospital, at a considerable distance from the rest of the corps, which should be dispersed as much as possible in separate billets and villages. Purulent ophthalmy is a disease which makes great head only when large numbers of persons are either exposed together to the epidemic causes, which first give birth to it, or to the causes which occasion the disease to be communicated from one individual to another, as when soldiers are crowded together in the same building, using the same towels and water, &c. Notwithstanding the reports of Roux and Larrey prove, that the disease did not spread in the French army, after the return of uncured soldiers from Egypt to France, though these were freely mixed with their comrades in hospitals and barracks the same security did not extend to the British troops lately in the latter country, who at one time were threatened with a very extensive renewal of the Egyptian ophthalmy among them, but which was wisely checked by attention to the principles above specified, and in which Dr Grant, the head of the medical department of that army, had the greatest confidence.

In the cases under Mr. M'Gregor, local applications were found most advantageous. During the inflammatory stage, however, this gentleman also had recourse to antiphlogistic means, spare diet, bleeding, neutral salts, &c. The topical treatment was as follows: Leeches were freely and repeatedly applied near the eye. But while there was much surrounding redness, instead of leeches, which created too much irritation, fomentations, with a weak decoction of poppy-heads, and a little brandy, were used. A weak solution of acetate of lead, and sulphate of zinc, had mostly a good effect when applied to the eye. The vinous tincture of opium did not answer the expectations entertained of it. But of all the remedies, the ung. hydrarg. nitrat. was found most frequently successful. It was applied by means of a camel-hair pencil, and at first weakened with twice its quantity of lard. The red precipitate, well levigated, and mixed with simple ointment, sometimes answered when the ung. hydrarg. nitrat. failed. Well levigated verdigris, and a quack medicine, called the golden ointment, proved also sometimes efficacious. (*P.* 41—43.) According to Mr. M'Gregor, blisters behind the ears, and upon the neck, are useful; but hurtful when put nearer to the eye. In cases where the disease seems to resist antiphlogistic means, and ulceration has commenced on the external surface of the cornea, this gentleman approves of discharging the aqueous humour by a puncture, as advised by Mr. Wardrop.

When the violence of the inflammation has subsided, Mr. M'Gregor recommends the use of Bates's camphorated water, diluted with four, five, or six times its quantity of water. But the astringent collyrium, from which he saw most good derived, was a solution of the nitrate of silver, in the proportion of half a grain to every ounce of distilled water. In some cases, it may be used stronger.

Tepid sea-water sometimes proved serviceable in removing the relics of the complaint. (*P.* 56 *&c.*)

The late Mr. Ware was in favour of bleeding; but he rarely carried it to the extent which has been done in the army. In weak persons, instead of repeated venesection, he preferred topical bleeding, either from the vein that passes on the side of the nose, or by means of five or six leeches put on the temple. Sometimes he thought it better to scarify the inside of the lower eyelid with the point of a lancet, carried along parallel to, and very near the margin of this part. He objects to pricking the eyelid in an infinite number of places, as very painful, and likely to increase the irritation. The lancet (he says) never need be applied more than twice, and rarely more than once; and, perhaps, less pain will be occasioned by making the incision with the edge, rather than the point of the lancet. After taking away blood, Mr. Ware says, a large blister on the head, or back, is often useful. Anodynes should be given, with occasional purgatives, and an antiphlogistic regimen. (*Ware on Purulent Ophthalmy*, 1808. *p.* 26, *&c.*)

As a local application, Mr. Ware preferred the aqua camphorata, which was used exactly in the same way, as will be described in speaking of his method of treating the purulent ophthalmy of children. When the inflammation was very great, he only put four or five grains, instead of eight, of the sulphate of copper to eight ounces of water. He usually employed the lotion cold, especially in children; but in adults, in whom the general fever and local inflammation were considerable, he was obliged to use it warm. In cases of great pain and swelling, it should be very weak, less often applied, and sometimes only warm water injected. In such circumstances, Mr. Ware also sanctions fomenting the eye with a flannel, or sponge, wet with a hot decoction of poppy-heads, or mere hot water. When the cornea threatens to burst, this gentleman approves of opening it, in order to discharge the aqueous humour, by making an incision in a place where the scar will not obstruct vision, as first suggested by Mr. Wardrop.

Purulent Ophthalmy of Infants. Dr. Vetch describes the external appearances of this case as not materially different from those of the purulent ophthalmy of adults; but, he states, that its nature is considerably modified by the more delicate texture and greater vascularity of the parts affected, and the more intimate connexion, subsisting between the vessels of the conjunctiva and those of the sclerotic coat. Hence, he says, the inflammation is sooner communicated to this coat, and sloughing and ulceration of the cornea occur earlier in infants, than adults. When the œdema ceases, the inner surface of the palpebræ becomes sarcomatous, and this diseased surface, when the eyelids are opened, forms an exterior fleshy circle, beyond which the relaxed conjunctiva of the eye comes forward as a second; and often the caruncula lachrymalis adds still farther to the valvular appearance, which the part presents. (*On Diseases of the Eye, p.* 256—258.)

According to the late Mr. Ware, the principal difference between the purulent ophthalmy in infants and that in adults, consists in the different states of the tunica conjunctiva: in the former, notwithstanding the quantity of matter confined within the eyelids is often profuse, the inflammation of the conjunctiva is rarely considerable, and whenever the cornea becomes impaired, it is rather owing to the lodgment of such matter on it than to inflammation; a statement, which appears to me very questionable. But, in the purulent ophthalmy of adults, the discharge is always accompanied with a violent inflammation, and generally with a tumefaction of the conjunctiva, by which its membranous appearance is destroyed, and the cornea is made to seem sunk in the eyeball. (*Ware on Epidemic Purulent Ophthalmy, p.* 23.) In children, the affection of the eyes is occasionally accompanied with eruptions on the head, and with marks of a scrofulous constitution. (See *Ware, p.* 138, *&c.*) The only inference to be drawn from this fact is, that scrofulous, as well as other children, are liable to this disorder of their eyes.

The following is the treatment recommended by Mr. Ware. If the disease be in its first stage, the temporal arteries are to be opened, or leeches applied to the temples, or neighbourhood of the eyelids, and a blister put on the nape of the neck and temples. The child should be kept in a cool room, not covered with much clothes, and if no diarrhœa prevail, a little rhubarb or magnesia in syrup of violets should be prescribed.

A surgeon, however, is seldom called in before the first short inflammatory stage has ceased, and an immense discharge of matter from the eyes has commenced. Of course, (says Mr. Ware,) emollient applications must generally not be used. On the contrary, astringents and corroborants are immediately indicated, in order to restore to the vessels of the conjunctiva and eyelids their original tone, to rectify the villous and fungous appearance of the lining of the palpebræ, and thus finally to check the morbid secretion of matter. For this purpose Mr. Ware strongly recommends the *aqua camphorata* of Bates's Dispensatory: ℞. Cupri sulphatis, bol. armen. ā ā ℥iv. Camphoræ, ℥j. M. & f. pulvis, de quo projice ℥j. in aquæ bullientis ℔iv. amove ab igne, et subsidant fœces. Mr. Ware, in his late *Remarks on Purulent Ophthalmy*, 1803, observes, that he usually directs the aqua camphorata as follows: ℞. Cupri sulphatis. bol. armen. ā ā gr. viij. Camphoræ gr ij. Misce, et affunde aquæ bullientis ℥viij. Cùm lotio sit frigida. effundatur limpidus liquor, et sæpissimê injiciatur paululum inter oculum et palpebras. This remedy possesses a very styptic quality; but, as directed in Bates's Dispensatory, it is much too strong for use before it is diluted; and the degree of its dilution must always be determined by the peculiar circumstance of each case. Mr. Ware ventures to recommend about one dram of it to be mixed with an ounce of cold clear water, as a medium or standard, to be strengthened or weakened as occasion may require. (*P.* 143.) The remedy must be applied by means of a small ivory or pewter syringe, the end of which is a blunt-pointed cone. The extremity of this instrument is to be placed between the edges of the eyelids, in such a manner, that the medicated liquor may be carried over the whole surface of the eye. Thus the matter will be entirely washed away, and enough of the styptic medicine left behind to interrupt and diminish the excessive discharge. According to the quantity of matter, and the rapidity with which it is secreted, the strength of the application, and the frequency of repeating it, must be regulated. In mild recent cases, the lotion may be used once or twice a day, and rather weaker than the above proportions; but, in inveterate cases, it is necessary to apply it once or twice every hour, and to increase its styptic power in proportion; and when the complaint is somewhat relieved, the strength of the lotion may be lessened, and its application be less frequent.

"The reasons for a frequent repetition of the means just mentioned, in bad cases, are, indeed, of the most urgent nature. Until the conjunctiva is somewhat thinned, and the quantity of the discharge diminished, it is impossible to know in what state the eye is; whether it is more or less injured, totally lost, or capable of any relief. The continuance or extinction of the sight frequently depends on the space of a few hours: nor can we be relieved from the greatest uncertainty in these respects, until the cornea becomes visible." (*Ware, p.* 145.)

This author condemns the use of emollient poultices, which must have a tendency to increase the swelling and relaxation of the conjunctiva. If poultices are preferred, he particularly recommends such as possess a tonic or mild astringent property; as one made of the curds of milk, turned with alum, and an equal part of the unguentum sambuci, or axungia porcini. This is to be put on cold, and frequently renewed, without omitting the use of the injection. (*Ware, p.* 147.)

When the secreted matter is glutinous, and makes the eyelids so adherent together, that they cannot be opened, after being shut for any length of time, the adhesive matter must be softened with a little fresh butter mixed with warm milk, or by means of any other soft oleaginous liquor, after the poultice is taken off, and before using the lotion. (*P.* 147.)

If the eversion of the eyelids only occurs when the child cries, and then goes off, nothing need be done in addition to the above means. When, however, the eversion is constant, the injection must be repeated more frequently than in other cases; the eyelids put in their natural position, after its use; and an attendant directed to hold on them, with his finger, for some length of time, a compress dipped in the diluted aqua camphorata. (*P.* 148.)

In some cases, when the inside of the eyelids has been very much inflamed, the tinctura thebaica, insinuated between the eye and the eyelids, has been useful. If, after the morbid secretion is checked, any part of the cornea should be opaque, the unguentum hydrargyri nitrati, melted in a spoon, and applied accurately on the speck, with a fine hair pencil; or Janin's ophthalmic ointment, lowered and used in the same manner, may produce a cure, if the opacity be not of too deep a kind. When the local disease seems to be kept up by a bad habit, alteratives should be exhibited, particularly the black sulphuret of mercury, or small doses of calomel.

The treatment, recommended by Dr. Vetch, is as follows: if the inflammation has not extended to the conjunctiva of the eye, its further progress may be checked by removing the infant to a healthy atmosphere, and washing the eye with any mild collyrium. Leeches are commended throughout the whole course of the complaint. On the first accession of the tumefaction, the best effect will often be produced by the application of a small portion of ointment, composed of lard, or butter ℥vj, and x gr. of the red nitrate of mercury, without any wax. As the purulency advances, the liquor plumbi subacetatis, he says, will be found not less serviceable, than in other instances of purulent ophthalmy. For promoting the separation of any slough, he recommends a solution of the nitrate of silver; and for curing the relaxed state of the conjunctiva, a solution of alum, or of the sulphate of copper. (*On Diseases of the Eye*, p. 260.)

The *Purulent Ophthalmy arising either from suppression of gonorrhœa, or from the inadvertent conveyance of gonorrhœal matter to the eyes*, is said to produce rather a swelling of the conjunctiva, than of the eyelids, which is followed by a discharge of a yellow greenish matter, similar to that of clap. The heat and pain in the eyes are considerable; an aversion to light prevails, and, in some instances, an appearance of hypopion is visible in the anterior chamber of the aqueous humour. When the complaint proceeds from the second cause, it is described as being less severe, than when it arises from the first. However, by such gentlemen, (*Ware, Travers, &c.*) as have seen unequivocal instances of purulent ophthalmy excited in the second way, the disease is said to be remarkable for its violence and intensity. The reality of cases of purulent ophthalmy from the application of gonorrhœal matter to the eyes, seems supported by such a mass of evidence, that I believe the fact must be admitted. Yet, from some statements, lately published by Dr. Vetch, it would appear, that the frequency of this mode of infection must be very much lessened by the circumstance of the matter taken from the urethra, not being capable of communicating the disease to the eyes of the individual, by whom such matter is secreted, though probably capable of doing so to the eyes of another person.

In the same way, the urethra cannot be affected by the application of matter taken from the purulent eyes of the individual, on whom the experiment is made. At least, of these circumstances, there is a negative proof in some facts recorded by Dr. Vetch. "In the case of a soldier, received in a very advanced stage of the Egyptian ophthalmia, in whom destruction of the cornea had to a certain extent taken place, I took occasion to represent the possibility of diverting the disease from the eyes to the urethra, by applying the discharge to the latter surface. Accordingly, some of the matter taken from the eyes, was freely applied to the orifice of the urethra. No effect followed this trial, which was repeated on some other patients, all labouring under the most virulent state of the Egyptian disease, and in all the application was perfectly innocuous. But, in another case, where the matter was taken from the eye of one man, labouring under purulent ophthalmia, and applied to the urethra of another, the purulent inflammation of the urethra commenced in thirty-six hours afterward, and became a very severe attack of gonorrhœa. From the result of these cases, (says Dr. Vetch) I could no longer admit the possibility of infection being conveyed to the eyes from the gonorrhœal discharge of the same person. Some time after this, the improbability, or rather impossibility of this effect, was rendered decisive by an hospital assistant, who conveyed the matter of gonorrhœa to his eyes, without any affection of the conjunctiva being the consequence." (See *Vetch on Diseases of the Eye*, p. 242.) Hence, this gentleman is led to refer the connexion, between gonorrhœa and ophthalmia, in the same person, to peculiarity of constitution; but the theories on which this opinion rests, my limits will not allow me to examine.

If it be actually true, that, in adults, a species of purulent ophthalmy does originate from the sudden suppression of a gonorrhœa, are we to consider the complaint so produced as a metastasis of the disease from the urethra to the eyes? This ophthalmy does not regularly follow the suppression of gonorrhœa; nay, it is even a rare occurrence: also, when it is decidedly known, that the purulent ophthalmy has arisen from the infection of gonorrhœa, namely, in those instances in which the matter has been incautiously communicated to the eyes, it appears that such an affection of these organs, so produced, is different from the one alluded to, inasmuch as it is slower in its progress, and less threatening in its aspect. When the eyes are affected, the disease of the urethra is not always suspended. (*Vetch on Diseases of the Eye*, p. 239.) Hence, there is good reason for supposing that no metastasis takes place in this species of purulent ophthalmy, supposed to be connected with a suppressed gonorrhœa: but, we must be content with inferring that, if it really has such a cause, it originates from a sympathy, prevailing between the urethra and eyes, and, that the difference of irritability, in different people, is the reason, why it is not an invariable consequence of the sudden stoppage of a gonorrhœa.

The injection of warm oil, the introduction of a bougie into the urethra, and the application of cataplasms to the perinæum, with a view of renewing the discharge from the urethra, form the outline of the practice of those who place implicit reliance in the suppression of gonorrhœa being the cause of the complaint. The rarity of the occurrence; the frequency of the sudden cessation of the urethral discharge; the possibility of an ophthalmy arising, as well at this particular moment, as at any other, totally independent of the other complaint; cannot fail to raise in a discerning mind a degree of doubt concerning the veracity of the assigned cause. Besides, admitting that there is a sympathy between the urethra and eyes, how are we to ascertain whether the suppression of gonorrhœa be the cause or the effect of the ophthalmy, supposing that the one ceases and the other commences about the same time? Actuated by such reflections, I am induced to dissuade surgeons from adopting any means calculated to renew a discharge of matter from the urethra. When the purulent ophthalmy, in adult subjects, is decidedly occasioned by the actual contact, and infection of gonorrhœal matter, applied accidentally to the eyes, no one has recommended this unnecessary and improper practice.

The first indication in the treatment of the disease from either cause, is to oppose the violence of the inflammation, and thus resist the destruction of the eye and opacity of the cornea. A copious quantity of blood should be taken away both topically and generally; mild laxatives should be exhibited, and a blister applied to the nape of the neck, or temples. The eyes ought to be often fomented with a decoction of white poppy-heads, and warm milk repeatedly injected beneath the eyelids. To prevent the palpebræ from becoming agglutinated together, during sleep, the spermaceti cerate should be smeared on the margins of the tarsi every night.

When the heat and pain in the eyes, and febrile symptoms have subsided; when an abundant discharge of pus has commenced; all topical emollients are to be relinquished, and a collyrium of Aq. rosæ ℥x. containing Hydrarg. oxy. mur. gr. j. used in their place. Scarpa states, that in the ophthalmia, originating from the inadvertent communication of the matter of gonorrhœa to the eyes, applications, in the form of ointment, such as the ung. hydrarg. and Janin's salve, to which might be added the ung. hyd. nitrat. avail more, than fluid remedies.

Inflammation of the Eyeball in general. From cases in which the eyelids are at first chiefly affected, I pass to the consideration of inflammation, as commencing in the eyeball itself. As Beer remarks, fortunately it is only very seldom, that the whole of the organ is at once attacked with genuine idiopathic inflammation, without any part of its texture being spared. Although this kind of ophthalmy is far more frequent than common inflammation of the orbit, it is much more rare than the same disorder of the eyelids. For the most part, healthy inflammation of the eyeball has a limited point of origin, from which it spreads, sometimes quickly, sometimes slowly over the whole organ. During an exceedingly violent, tense, throbbing pain, affecting not only the eye itself, but extending to all the surrounding parts, the bottom of the orbit, and within the head, the white of the eye becomes suffused with an uniform redness, which, on attentive examination, is found to be seated not only in the conjunctiva of the eyeball, but also in the sclerotica, and to exhibit at first a very fine vascular network, which, as the redness grows more intense, assumes the appearance of scarlet cloth, forming all round the cornea an uniform circular prominent fold, which has a very firm feel, and is so tender, that, when touched in the gentlest manner, the patient cries out with agony. The circumference of the cornea continues to be more and more covered by this increasing swelling of the conjunctiva, until at length only a portion of its centre remains visible. At the same time, the pupil is very much contracted; the iris motionless; and though vision is nearly or entirely lost, the patient is seriously disturbed by fiery appearances before the eye. When the iris is naturally gray, or blue, it turns greenish, and when brown, or black, it becomes reddish. Every movement of the eyeball and upper eyelid is suspended, and the orbit feels to the patient, as if it were too small, which, Beer says, is in reality the case, because the whole of the eyeball, and not merely the conjunctiva, is enlarged, so as to project like a lump of raw flesh further and further between the edges of the palpebræ, and completely fill every part of the orbit. While the eyeball enlarges, the cornea always loses its transparency, and the inflammation spreads to the eyelids, the lower one at last becoming everted by the excessive and firm tumefaction of the parts behind it, and the upper one presenting the most unequivocal marks of phlegmonous inflammation. The secretion of tears and mucus is now entirely suppressed, and of course, the eye preternaturally dry. At the very commencement of this violent form of ophthalmy, the constitution is disturbed by a severe attack of inflammatory fever, and irritable patients are not unfrequently seized with delirium.—Here, says Beer, terminates the first stage of this very dangerous disorder.

When the disease is left to itself, suppuration comes on, attended with fever and constant shiverings; the swelling of the sclerotic conjunctiva undergoes a remarkable increase, and assumes a dark red colour, at the same time that it becomes softer. The pain becomes irregular, throbbing, and, when the eye or eyelids are touched, of a lancinating description. As a morbid secretion now begins to take place from the Meibomian glands, the swelled conjunctiva has a more moist appearance. The upper eyelid has a purple hue, and, on account of the continually increasing size of the eyeball, is pushed further and further outward. The portion of the cornea, still discernible in the middle of the protuberant conjunctiva, acquires a snowy whiteness, which afterward changes to yellow. The patient feels an oppressive sense of heaviness in the orbit, and a disagreeable kind of coldness all round the eye. At length the throbbing and tension are so agonizing, that the patient often expresses a wish to have the eyeball extirpated. If no effectual treatment be adopted, the eye now bursts, and a mixture of matter and blood, together with the scarcely perceptible remains of the lens and vitreous humour, is discharged with considerable force to some distance in front of the patient; an occurrence sometimes termed *rhexis*, or *rhegma oculi*. From this moment, the pain all at once subsides into a very moderate feel of burning in the eye; and suppuration goes on, until all the textures of the organ are annihilated, the orbit has an empty appearance, and the closed eyelids sink into a concavity. Thus ends, as Beer observes, the second stage, after much tedious and general indisposition. But, he remarks, that the course of the case is quite different, when it has been wrongly treated in its first stage with stimulants, or exposed to the ill effects of tobacco smoke, the drinking of spirits, improper diet, immoderate exercise, &c.; for, under the operation of these unfavourable circumstances, the second stage may commence with dreadful gangrenous mischief, every vestige of the organization of the eye disappearing, and the parts at length sphacelating, while large abscesses form around, and, unless efficient medical aid be promptly given, the patient loses his life.

With respect to the causes of such an attack of the whole eyeball at once by common inflammation in a healthy subject, they must be of an exceedingly violent description, such as injuries produced by gunpowder, burns, and lesions either of a mechanical kind, or acting both chymically and mechanically together, a subject already fully treated of in the foregoing columns.

The following are the observations which Beer delivers on the prognosis: While, in the first stage of this dangerous form of ophthalmy, the eyesight yet remains, and the eyeball itself is not enlarged, if the patient can be properly taken care of, some hope may be entertained of dispersing the inflammation so favourably, that, with the exception of a weakness of sight, of longer or shorter continuance, no ill effects will be left. It is manifest, however, that under these circumstances, the surgeon should not be too bold in promising a perfect cure; for, the very commencement of such an inflammation of the whole eyeball, even when the disorder is purely idiopathic, is unavoidably attended with some risk, not only of permanent blindness, but of the eye itself being destroyed in the most painful manner; and, when things turn out rather better, a tolerably favourable termination of the case is uncommon. But, as soon as the power of seeing is quite lost, the pupil nearly closed, and the eyeball prodigiously swelled, it will be fortunate, if the inflammation can be resolved, so as to preserve the shape of the organ; for the restoration of the eyesight is entirely out of the question. But, besides the irremediable loss of vision, the disorder under these circumstances always produces a greater or lesser closure of the pupil, which, however, has no share in causing the blindness.

In the second stage of the case, of course, the hope of restoring vision is quite past, and if the eyeball itself, and not merely the conjunctiva, has been considerably swelled in the first stage of the case, the chance of preserving the natural shape of the organ extremely unpromising. But, when the eye bursts, the latter desideratum is impossible. If the first stage should have been so violent as to have induced gangrene, the practitioner will have enough to do in preventing sphacelus, and death, the danger of which is considerable, on account of the intimate connexion between the eye and parts in the orbit, and the brain and its membranes.

In the first stage, antiphlogistic treatment, in the general sense of the expression, is indicated, and the case is not to be regarded merely as a local disorder. However, with respect to topical bleedings, the surgeon, says Beer, should be more active, than in other examples of ophthalmy, and, after copious venesection and the use of leeches have produced some relief, the protuberant conjunctiva, round the cornea, should be deeply scarified with a lancet. If, in the first stage, delirium come on, as it sometimes does during the violence of the inflammatory fever, Beer directs one of the external jugular veins to be opened: or blood might be taken from the temporal artery.

In the second stage of the case, when the re-establishment of vision is quite impossible, and the objects are to endeavour to keep the eye of a good shape, and quickly lessen the suppuration, warm emollient poultices, and particularly those made of apples, are the applications, on which Beer bestows his praises. This topical treatment is to be assisted with internal means, as explained in the preceding pages, because the disorder is attended with a general disturbance of the constitution. When matter is fully formed, and its fluctuation can be distinctly felt, Beer approves of opening the abscess with a lancet; for, it is only by this means, that the annihilation of the eyeball can be prevented. If the eye has already burst, the preservation of its form is no longer possible, and, according to Beer, both the topical and general treatment should be partly of a tonic description. When gangrenous mischief has occurred, the practice ought to conform to the principles explained in the article *Mortification*.

External Ophthalmy. Inflammation of the Outer Coats of the Eye. Ophthalmitis Externa Idiopathica, of Beer. The modifications of this common species of ophthalmy, as the latter author observes, have a variety of names applied to them, as *ophthalmia levis*, *ophthalmia angularis*, *taraxis*, and sometimes *chemosis*, and *ophthalmia sicca*. Together with a preternatural dryness of the eye, and a sensation, as if the eyeball were compressed on every side, the white of the eye becomes covered with a general redness, which, though it affect both the sclerotica and the conjunctiva, will be found on attentive examination to be much more considerable in the former, than the latter membrane, in which only a delicate plexus of blood-vessels is at first perceptible. The motions of the eye and eyelids are not absolutely prevented; yet, the patient never moves these parts except when he is actually obliged to do so, as every motion of them, if not actually painful, occasions a good deal of annoyance. Though the cornea cannot be said to become opaque, its clearness is always much diminished, and this change is the greater, the redder the white of the eye appears. These effects, which occur almost simultaneously, are followed by pain, which increases every moment, at first extending over the whole eyeball, and then to the surrounding parts, and to the top of the head. As the pain grows more severe, every movement of the eyeball and palpebræ becomes more distressing, the dryness of the eye greater, and the redness of the sclerotic conjunctiva augments, either more slowly, or quickly, according to the degree of inflammation until the network of blood-vessels, which was at first distinguishable, entirely disappears, and the conjunctiva looks like a piece of red cloth, quite concealing the sclerotica, and forming round the cornea a very painful, firm, uniform circular projection. Thus, the cornea seems as if it lay in a depression, with its margin partly covered by this inflammatory swelling of the conjunctiva. At the period, when the protuberance of the latter membrane takes place, the cornea itself always becomes less and less clear, and of a reddish gray colour, so that neither the iris nor the pupil can be any longer distinguished, and the power of vision is reduced to a faint perception of light. The pain, which was that of heaviness and tension, now becomes of a throbbing description, and the eyelids, which now begin to participate in the effects of the inflammation, are no longer capable of covering properly the swelled conjunctiva. The eyeball and eyelids are perfectly motionless; and, if an attempt be made by the patient to move them, the efforts of the muscles may be perceived, but still no movement of the parts intended is performed. The orbit feels as if it were too small for the eye, and the constitution suffers a severe attack of inflammatory fever. Thus, says Beer, does the first stage of this form of ophthalmy gradually rise to its highest degree, to which he applies the name of *true chemosis.*

However, it is observed, that idiopathic external ophthalmy does not always become so violent, as for instance, when the complaint has been excited merely by the lodgment of some small foreign body under the eyelids; for though in such a case the conjunctiva and sclerotica are both reddened together, yet even when no aid is afforded, if no other sources of greater irritation are present, the redness does not readily increase so as quite to conceal the sclerotica, or to be attended with an inflammatory swelling all around the cornea. This milder form of external ophthalmy has sometimes received the name of *taraxis.* It is the *mild acute ophthalmy* of Scarpa, characterized, as this author says, by redness of the conjunctiva and lining of the eyelids, an unnatural sensation of heat in the eyes, uneasiness, itching, and shooting pains, as if sand were lodged between the eye and eyelids. At the place where the pain seems most severe, Scarpa remarks, that some blood-vessels appear more prominent and turgid than other vessels of the same class. The patient keeps his eyelids closed; for he feels a weariness and restraint in opening them, and by this means he also moderates the action of the light, to which he cannot expose himself, without increasing the burning sensation, lancinating pain, and effusion of tears. If the constitution be irritable, the pulse will be a little accelerated, particularly towards the evening; the skin dry; and sometimes slight shiverings, and nausea and sickness take place.

According to Scarpa, mild acute ophthalmy is often the consequence of a cold, in which the eyes, as well as the pituitary cavities, fauces, and trachea, are affected. It is not unfrequently occasioned by change of weather, sudden transitions from heat to cold, the prevalence of easterly winds, journeys through damp, unhealthy, sandy countries, in the hot season of the year, exposure of the eyes to the vivid rays of the sun, draughts of cold air, dust, &c. Hence, it does not seem extraordinary, that it should often make its appearance as an epidemic, and afflict persons of every age and sex. As additions to the list of remote causes, authors enumerate the suppression of some habitual evacuation, as bleedings from the nose, or piles, the menses, &c. a disordered state of the primæ viæ, worms, dentition, &c.

Between Beer and some late writers, there is either one point of difference in their descriptions of external ophthalmy, or else they mean different cases; for while Beer represents the redness as affecting the sclerotica at first more than the conjunctiva, other writers describe the affection of the sclerotica as generally secondary, when it happens at all; for according to modern observations, it is not *unavoidably* either an attendant upon, or an effect of simple inflammation of the conjunctiva.

As the second stage of external ophthalmy comes on, the symptoms vary, according to the degree of the complaint in its first stage; but when what Beer calls a *true chemosis* is produced, the following are described by him as the usual appearances. The circular prominent fold of the conjunctiva round the cornea, becomes of a dark red colour, and the swelling increases, but it becomes softer and less painful. The hardly visible portion of the cornea, situated in the depression formed by the circular protuberance of the conjunctiva, seems at first perfectly white, and afterward yellowish, being the seat of more or less purulent matter. Though the swelled conjunctiva is every where moistened with a thin whitish mucus, this secretion, says Beer, is never so copious as to run over the face, as in the case of ophthalmo-blennorrhœa. In this stage, the lower eyelid is turned somewhat outwards, in consequence of its lining becoming more swelled. While suppuration is taking place in the cornea, attended with the febrile symptoms which usually accompany the formation of acute abscesses, little collections of matter sometimes occur at different points of the conjunctiva, and after they have burst, a probe may easily be passed rather deeply into them, without any particular pain. (*Beer, B.* 1, *p.* 412.) The suppuration continually advancing, the swelling of the conjunctiva, and of the whole eyeball now diminishes, the effects of the inflammation penetrate deeply into the organ, and the structure of the eye is so altered as not to be cognizable, the part shrivelling up, as Beer says, into a motionless, whitish mass. However, according to this author, these deep effects of suppuration are sometimes produced only in a certain part of the eyeball, especially when the chemosis is the consequence of an external injury, and in this circumstance, the rest of the circumference of the globe of the eye exhibits its natural organization, while in the part above alluded to, there is a funnel-like depression, attended with a considerable diminution in the size of the organ.

But, says Beer, when an idiopathic external inflammation of the eye has only attained the milder degree, expressed by the term *taraxis;* as, for instance, when the complaint is principally owing to the lodgment of some mechanically, or chymically irritating substance under the eyelids, the redness of the conjunctiva and sclerotica undergoes a remarkable increase on the accession of the second stage; the first of these membranes becomes somewhat swelled; the pain is lancinating and irregular: and the secretion of tears unusually profuse; but at the point where the extraneous substance lodges, an open superficial suppuration occurs, and according to Beer, the case both in the first and second stage, is generally accompanied with no febrile symptoms.

In the first stage, Beer represents the prognosis as very favourable, provided the disorder does not exceed that degree, to which the name of *taraxis* is applied; for with the aid of proper treatment, the inflammation, when of a healthy kind, may be soon so favourably removed, as not to leave a vestige of it behind. If the cause of the disorder be not greater than a moderate injury or wound of the eye, any traces of the lesion, which are perhaps still remaining, will disappear as soon as the inflammation subsides. On the other hand, when this kind of ophthalmy presents itself in the form of *true chemosis,* the prognosis is serious, and must be made with great reserve, especially when the patient is of a weak irritable constitution, a child, very stubborn and unmanageable, or incapable of following strictly the advice which he receives from his medical attendant; for, under these circumstances, it will not be in the power of the latter to prevent the complaint from advancing unremittingly to its second stage, in which event the ill consequences of suppuration will be incalculable. But if these unfavourable conditions are not present, though the genuine idiopathic chemosis may really have attained a violent, and almost its highest degree in the first stage, not only the eye may be saved by prompt and judicious treatment, but also the eyesight; nor will the result be different, even when the cornea continues for some time deprived of its transparency, and the power of vision impaired by a slight varicose affection of its conjunctival covering. These effects, says Beer, at length completely disappear, less in consequence of the aid of medicine, than of a proper regimen, the uninterrupted enjoyment of a fresh, dry air, &c.

The prognosis in the second stage, is under very different circumstances; for, as Beer observes, though the inflammation in the first stage may really not exceed that degree which is implied by the term *taraxis,* yet if any suppurating point, occasioned by some slight preceding injury, be not efficiently treated, or if there be any loss of substance, already produced by the injury itself, a more or less opaque, white cicatrix is apt to remain on the cornea, and cause a permanent impediment to vision in a degree determined by the situation and extent of the opacity. And in addition to this risk it is to be remembered, that if the suppurating point be entirely neglected, or erroneously treated, the cornea or sclerotica may be penetrated by ulceration, and in the first case, a prolapsus of the iris, an adhesion of this organ to the cornea, (synechia anterior,) a disfigurement of the pupil, or an irregularity of the cornea, be produced; while, in the second, the consequences may be a partial wasting away of the eyeball, attended with loss of sight, and of the natural shape of the part. (*Beer. B.* 1, *p.* 417.)

Beer further observes, that when this species of ophthalmy presents itself in its first stage in the form of *true chemosis,* the prognosis in the second stage is very unfavourable; for when the cornea is generally pervaded by suppuration, the eyesight, and, in some degree, the form of the eyeball, are for ever lost, and it will be lucky, if the case can be brought to a conclusion with the mere destruction of the cornea. But when the matter points at once in several places of the conjunctiva, round the cornea, all idea of preserving the shape of the eye sufficiently for the application of an artificial eye is out of the question, and the surgeon will be very successful, if he can now check in moderate time the suppuration, which continues with a good deal of general indisposition. An extraordinary relaxation of the conjunctiva of the lower eyelid, and a consequent ectropium, are the least disastrous effects of the abscesses of the eye thus produced. Lastly, Beer remarks, that when chemosis is in the second stage, that is to say, attended with suppuration of the eye, it rarely happens, under the most favourable circumstances, that the eyesight and shape of the organ can be preserved entirely free from permanent injury. (*B.* 1, *p.* 418.)

Let us next consider the treatment of idiopathic external ophthalmy in its modifications of simple inflammation of the conjunctiva, mild acute ophthalmy, or taraxis, and severe acute ophthalmy, with chemosis.

According to Mr. Travers, simple inflammation of the conjunctiva unconnected with injury of the eye, and neither depending upon any established disorder of the system, nor modified by a scrofulous diathesis, may be easily and speedily reduced, even in its most acute form, by bleeding and some brisk doses of purgative medicine. (*Synopsis of the Diseases of the Eye, p.* 247.) For the relief of mild acute ophthalmy, Scarpa recommends low diet, gentle purging with small repeated doses of antimonium tartarizatum, the removal of any extraneous body lodged under the eyelid, and frequently washing the eye with a warm decoction of mallow leaves, and covering it with a very soft emollient poultice, included in a fine little muslin bag. Mr Travers also expresses his decided preference to a tepid application in the painfully acute stage of inflammation, and considers simple warm water generally better than medicated lotions, like the aqueous solution of opium, or infusions of poppy and hemlock.

When the disease presents itself in its first stage, in the mild form of taraxis, says Beer, it usually runs its course, quite uncomplicated with any general indisposition, and may be cured by moderate antiphlogistic treatment, in which, indeed, since the eyeball itself is affected, particular attention must be paid to lessening the action of the light and air upon the organ. But when a true chemosis is present, every antiphlogistic means must be promptly and rigorously put in practice, internal as well as external remedies being employed, and besides common measures, the conjunctiva, round the cornea, is to be scarified; a proceeding never necessary in the case of taraxis. Such scarifications, Beer observes, have a wonderful effect when practised at the proper period, after venesection and topical bleeding with leeches have been fully put in execution, and when the cuts are made deep, so as to produce immediately a copious discharge of blood. "By means of such scarifications (says he) I have seen the inflammation and all its threatening effects recede, as it were, before my face, when no material relief could be effected by other measures." (*B.* 1, *p.* 419.)

According to the late Mr. Ware, there cannot be, in chemosis, an easier or more effectual remedy than æther. A few drops are to be poured into the palm of the hand, and diffused over it, which may be immediately done by pressing the other hand against it. The hand is then to be applied to the eye, and kept so close to it that the spirit, as it evaporates, may insinuate itself into the part affected, and act on the extravasated blood, so as to disperse it. In a few instances of chemosis, in which the swelling and inflammation have been considerable, this gentleman found the following application of singular service: ℞. Interiorum foliorum recentium Lactucæ Sissilis ℥iij. Coque cum aq. pur. ℥ss. in balneo mariæ pro semihora; tunc exprimatur succus, et applicetur paululum ad oculos et ad palpebras sæpe in die. (*Ware, p.* 54.) As these applications are not noticed by the generality of modern writers, I infer, that the superior efficacy imputed to them by the late Mr. Ware, is not such as to obtain the confidence of all other ophthalmic practitioners.

General and local bleeding, and, if chemosis be present, scarifications having been put in practice, the treatment is to be continued by administering purgatives of the mildest description, and, after their operation, applying blisters, according to the directions given in a preceding part of this article. In the first stage of severe acute ophthalmy, Scarpa considers topical emollient applications to the eye most beneficial, such as mallows boiled in new milk; bread and milk poultices; or the soft pulp of a baked apple; all included in fine little muslin bags. Remedies of this description should be renewed at least every two hours. The patient should be directed to observe perfect quietude, and to lie with his head in an elevated position. To keep the eyelids from adhering together in the night-time, the spermaceti cerate is proper. When ophthalmy is accompanied with a violent pain in the head, the late Mr. Ware recommended a strong decoction of poppy-heads to be applied as a fomentation. (*P.* 51.)

Under the preceding plan of treatment, the first stage of severe ophthalmy commonly abates in about a week. The burning heat and darting pains in the eyes, and the febrile disturbance of the constitution subside. The patient is comparatively easy, and regains his appetite. The eyes become moist again, and can now be opened without experiencing vast irritation from a moderate light. In this state, notwithstanding they may continue red, and the conjunctiva swelled, all evacuations are to be left off, as well as the use of topical emollients, for which latter astringent, corroborant collyria are to be substituted. Scarpa recommends the following application: ℞. Zinci sulphatis gr vj. Aquæ distillatæ ℥vj. Mucil. sem. cydon. mali ℥j. Spiritûs vini camphor guttas paucas. Misce et cola. This collyrium may be injected with a syringe, between the eye and eyelids, once every two hours; or the eye may be bathed in it by means of an eye-cup. Such persons as cannot bear cold applications to the eye, must have the same kind of collyrium a little warmed; but as soon as the irritability is lessened, it may be used cold.

Scarpa then speaks of the good effects produced in the second stage of ophthalmy by the application to the eye of two or three drops of the vinous tincture of opium, once or twice a day; a subject already considered in the foregoing columns. The utility of letting the eye be habituated to the light, as soon as it can bear it, is next strongly commended; a rule of great importance, but on which I need not here dwell, because it has been already insisted upon in the general observations.

When idiopathic external ophthalmy has terminated in suppurations of little extent, Beer speaks highly of the benefit derived from a solution of the lapis divinus, (see *Lachrymal Organs*) containing the liquor plumbi subacetatis, or from smearing the suppurating points with a little laudanum. In worse cases, Beer states, that, when such local treatment is combined with the internal exhibition of bark and naphtha, and a diet and regimen conducive to the support of the system, its efficacy is very great. And here, says he, it is worth observing, that while the solution of the lapis divinis is of great service in the second stage of *true chemosis*, it is more or less detrimental in the kind of chemosis which accompanies purulent ophthalmy, especially if not blended with mucilage, and, even when thus qualified, it cannot be endured by weak and irritable subjects, affected with the latter complaint; a fact not observed in other instances of chemosis. (*B.* 1, *p.* 420.) To Mr. Ware's use of æther in chemosis, I have already adverted.

When pustules, or abscesses in the swelled conjunctiva point round the cornea, a free outlet to the matter must be immediately made in each of them with a lancet; for, if this be not done, as Beer observes, the matter will spread extensively, and the eyeball be in danger of being destroyed. For an account of the method of treating the eversion of the lower eyelid, sometimes remaining as a consequence of the disorder, see *Ectropium*.

Inflammation of the Sclerotica. Sclerotitis.—The modern attempts to class ophthalmies, according to the texture of the eye first or chiefly affected, promises, I think, to lead to clearer views of the subject, and sounder practice. One circumstance, particularly adverted to, both by Dr. Vetch and Mr. Travers, in inflammation of the sclerotica, is the appearance of a vascular zone at the margin of the cornea. By the latter gentleman, this effect is ascribed to the particular distribution of the vessels. "Branches from the straight vessels of the conjunctiva, penetrate the sclerotica obliquely towards the margin of the cornea, and the long ciliary vessels pass in sulci of this membrane to the plexus ciliaris at the root of the iris. At the interior border of the sclerotica, where the annulus ciliaris is adhering closely to this tunic, the ciliary communicate with the muscular branches, and being in deep-seated inflammation fully injected with red blood, the condensation of colour gives the well-known and remarkable appearance of a vascular zone at the margin of the cornea." (*Synopsis, &c. p.* 126.) According to Dr. Vetch, only a few interspersed trunks are posteriorly observed, "which do not affect the natural appearance of the intermediate space, but these, diverging as they come forwards, produce a zone more or less complete, of minute hair-like vessels, distinguished by their rectilinear direction, and their uniform concentration towards the margin of the cornea; their colour advances with the progress of the disease, from that of a delicate pink, or damask rose, to a deeper hue, and imparting a faint blush to the part immediately surrounding it." (*On Diseases of the Eye, p* 27.) There appears, however, to be a good deal of variety in the symptoms of sclerotitis; for rheumatic inflammation of the eye, described by Professor Beer and Mr. Wardrop, as particularly affecting the sclerotica in common with other fibrous membranes, is not noticed by these authors as characterized by the red zone round the edge of the cornea. Indeed, instead of there being posteriorly only a few interspersed trunks, Mr. Wardrop states, "that (in rheumatic ophthalmy) the blood-vessels are generally *equally* numerous over the whole white of the eye, passing forwards in nearly straight lines from the posterior part of the eyeball, and advancing close to the cornea; but neither passing over it *nor leaving the pale circle around it*, which is so *striking when either the choroid coat or iris is inflamed*. If the vessels be closely examined, the general redness will be found produced more from numerous small ramifications than a few large trunks." (*Med. Chir. Trans. Vol.* 10, *p.* 3.) However, as if there must be no harmony on this subject, Beer describes the blood vessels, in rheumatic ophthalmy, not as being *equally* numerous over the whole white of the eye, but as being *in some places collected in larger numbers or clusters*, and he differs again from Mr. Wardrop, in describing the redness as coming on with considerable intolerance of light, (*Lehre von den Angenkr. B.* 1, *p.* 397—398,) while the latter author distinctly mentions, that "the eye does not seem to suffer from exposure to light." (*Med. Chir. Trans. Vol.* 10, *p.* 6.) I can only reconcile these accounts by concluding, that sclerotic inflammation, like that of other textures of the eye, has stages and modifications which account for these seeming contradictions. And, with respect to the vascular zone round the edge of the cornea, it would appear, at all events, to belong to iritis, as well as sclerotic inflammation. The vessels of the sclerotic coat are observed by Dr. Vetch to follow the motion of the eye, and he says, that they may, by this circumstance, be distinguished from those of the conjunctiva, "the vessels of the latter, independent of their *darker* colour, their more tortuous form, and varying size, have likewise a more longitudinal direction, and as they proceed from the angles of the orbit, they form radii of a larger circle. The distinction between the inflamed vessels of the conjunctiva and the sclerotica, (says Dr. Vetch) I consider to be, therefore, obvious; but, *that any difference can be observed in the arrangement or appearance of the vessels of the latter, sufficiently distinct to indicate the peculiarity of the exciting cause, or specific nature of the case, is more than I have been able to perceive.* The general character, as it arises out of the structure of the part, will be found the same, whether the cause be gout, rheumatism, or syphilis. The vessels, such as I have described them, will always be most observable on the upper portion of the eye, as it is in that place that the inflammation is most intense, except when its locality is affected by any external exciting cause, in which case it will be greatest near the injured part." (*On Diseases of the Eye, p.* 29.)

While Dr. Vetch describes the vessels of the conjunctiva as exhibiting in sclerotic inflammation a darker colour than that of the vessels of the sclerotic coat itself, Mr. Travers represents the vessels of the *latter membrane*, which pursue a straight course to the margin of the cornea, as having a somewhat *darker hue than the areolar vessels upon the loose portion of the conjunctiva.*

It should be mentioned, however, that by sclerotic inflammation. Dr. Vetch signifies inflammation of the eye itself, as contrasted with conjunctival inflammation; but, how far this will account for the differences, above pointed out, between his description and that of Mr. Travers, I am not prepared to say. According to Mr. Travers, ordinary inflammation of the sclerotica is secondary, that is to say, this membrane is usually affected only as intermediate to the conjunctiva and the other tunics. However, he has occasionally observed, in a recent ophthalmia, a turgescence of the vessels, which pursue a straight course to the cornea, unaccompanied with any affection of the iris, and so slight a vascularity of the loose conjunctiva, that he was disposed to regard the case as a primary sclerotitis. The inflammation, he says, is not acute, and the motions of the eyeball are painful. It sometimes accompanies, and sometimes follows rheumatic inflammation. If continued, it presents the vascular zone and a pupil contracted, or drawn a little to one side. It is often seen in company with eruptions, or sorethroat, of a pseudo-syphilitic character, or is secondary to gonorrhœa. (*Travers, Synopsis, &c. p.* 123.)

The practice, recommended by this gentleman, is as follows: obtuse pain in the eyeball, he says, may be materially relieved by blood-letting, and by antimony and ipecacuanha with opiates. Mercury is stated to have much less power over this case, than iritis. In general, the patient is seriously reduced, and very irritable, from suffering, rheumatic inflammation in the elbow, knee, or ankle; a state, to the production of which the previous use of mercury has commonly contributed. But though such is stated to be the case, the moderate and cautious employment of this mineral is set down as generally indispensable in the treatment. And in the interval of the mercurial action, the nitric acid is alleged often to be of great service. The preparations of mercury preferred by Mr. Travers in these cases, are the oxymuriate in doses of one 1-12 or 1-8 of a grain, and the hydrargyrus cum creta, in doses of from five to ten grains, twice or thrice a day. As auxiliaries for allaying irritation, he prescribes the pulv. ipecac. comp. hemlock, hyosciamus, and the extract of sarsaparilla, either dissolved in the decoction, or taken solid. (*Vol. cit. p.* 289.)

On *rheumatic inflammation of the eye*, a few observations will be hereafter inserted. *Idiopathic Inflammation of the Internal Textures of the Eyeball*, or *Internal Ophthalmy in general.* According to Beer, internal inflammation of the eye does not always originate in one particular texture, but, in some instances, commences in the retina, choroides, &c.; while, on other occasions, its principal seat is in the iris, from which membrane it quickly extends itself to the corpus ciliare, and the crystalline lens and its capsule, or else in another direction to the sclerotica, cornea, &c. These differences in the seat of the disorder obviously depend upon the way in which the exciting causes have operated; for, when they are such as immediately affect the retina only, the inflammation must have its origin in this texture, as when the disorder is produced by the effect of the sudden entrance of any very strong vivid or reflected light into the organ. This case Beer denominates *ophthalmitis interna idiopathica, proprie sic dicta.*

The exciting causes, however, may not affect directly the retina, and parts immediately next to it, but may operate chiefly upon the iris, in which event, this part is the chief seat of the inflammation, and the complaint is named both by Schmidt and Beer, *iritis idiopathica.* This form of inflammation, Beer says, is seen after the extraction of the cataract, and accidental injuries of the eye, where the weapon, with which they were produced, has either penetrated directly to the iris, and more or less caused it, or roughly entered the eyeball near the ciliary edge of this membrane, without actually wounding it. (*Lehre von den Angenkrankh. B.* 1, *p.* 421.)

Symptoms of the first stage of idiopathic internal ophthalmy, properly so called. While a very uneasy sensation of general constriction and tension affects the whole eyeball, and soon changes into an obtuse, deep throbbing pain, increasing every instant, and quickly propagating itself over the eyebrows to the top of the head, as Beer observes, the power of vision gradually declines, and, at the same time, the pupil, which plainly loses its clear shining blackness, contracts without being deprived of its circular figure, or drawn out of its natural position, until, at length, it is so completely closed, that the iris seems as if it had no aperture whatever. But long before this perfect closure of the pupil has taken place, the power of seeing is entirely gone, though after the faculty of perceiving the external light is extinguished, fiery appearances, which trouble the patient seriously, are seen at each pulsation of the blood-vessels within the eye. As the developement of these symptoms is going on, the iris evidently loses its natural colour, becoming, as Beer says, greenish, when it was gray, or blue; and reddish, when its was brown, or black. In consequence of the iris swelling, and projecting towards the cornea, the anterior chamber becomes considerably diminished. Immediately the least mark of the swelling of the iris is seen, together with a moderate degree of contraction of the pupil, the whole sclerotica assumes a pink-red colour; a plexus of innumerable blood-vessels is seen in the conjunctiva; and the cornea loses a good deal of its natural brilliancy, without being actually opaque. The latter symptoms of this form of ophthalmy are attended with manifest general indisposition, and intolerable headach. Sometimes in the first stage of the case, the pupil, though much lessened, is not absolutely closed, but thickish, and if examined with a magnifying glass, it has a reddish-gray appearance, and the power of vision, notwithstanding the continuance of the aperture, is quite lost. (*Beer.*)

Symptoms in the second stage. According to the same author, while the eye is suffernig very irregular throbbing pain, attended with a sensation of heaviness and cold in the eye, an increase of the redness of the conjunctiva, severe constitutional disturbance, and constant shivering, there is suddenly formed at the bottom of the anterior chamber a collection of matter which above presents a horizontal line, but on every inclination of the head sideways, changes its position. This matter continues to accumulate more and more, until it not only reaches the pupil, but fills the whole of the anterior chamber, constituting the case termed *Hypopium.* If the disease be left to itself, says Beer, the matter collects in such quantity, that the cornea is rendered more prominent, and afterward conical, very like an abscess, ultimately bursting during an aggravated attack of pain, when the eye shrinks, and the sufferings gradually cease. This kind of hypopium Beer names *true*, in order to distinguish it from the case, in which the matter passes into the anterior chamber out of an abscess in the cornea, and which he terms a *false* hypopium. When, at the end of the first stage, the pupil is not entirely closed, one may discern in the second stage, at the period of matter presenting itself at the bottom of the anterior chamber, (though not easily with the unassisted eye) whitish filaments, extending from the edge of that opening towards its centre, produced by the coagulable lymph effused in the aqueous humour, the secretion of which was interrupted in the first stage, but now commences again. And, continues Beer, one may perceive, with a good magnifying glass, a very delicate cobweb-like membrane, which, when the matter collected lies over the pupil, and remains for a good while unabsorbed, at length becomes quite yellow, the matter being really encysted by it in the form of a small lump, which remains in the pupil, and partly projects into the anterior chamber, forming the case, which Beer denominates a *spurious purulent cataract*, to which the edge of the iris is so closely adherent, that sooner than a separation could be effected, the whole of the iris would be torn in pieces. When the pupil has been completely closed in the first stage, these effects of course cannot take place.

Beer remarks, with respect to the causes of this form of ophthalmy, that, as there are not many circumstances which can produce it, the case belongs rather to the less frequent kinds of inflammation of the eye. As predisposing, he mentions plethora and irritabilityof the eyes, occasioned by little exercise of them. Experience has convinced him, however, that by far the most usual cause of this internal ophthalmy is an extraordinary, long-continued straining of the eye in the inspection of small microscopic objects in a strong reflected light.

Respecting the prognosis, it is remarked by Beer, that this is not unfavourable, when the inflammation of the eyeball is moderate, proper treatment can be immediately employed, the pupil is not yet very much contracted, and the power of seeing not considerably impaired. But if the power of vision should seem as if it were abolished, the prognosis is extremely uncertain. And if the pupil should close after the entire stoppage of vision, no hope can be entertained of the recovery of the sight; for if the pupil open again on the subsidence of the inflammation, it will yet continue very small and motionless, and the eye blind. When the case is mistaken in its first stage, and neglected or erroneously treated, Beer says, it changes into a very perilous general inflammation of the whole eyeball; a disorder already considered.

In the second stage the prognosis is always unfavourable; for the eyesight has always been already destroyed at the end of the first one, and the only expectation of the practitioner can now be to preserve the shape of the eye, while as speedy a check as possible is put to the suppuration. If the case has been so mismanaged in its first stage, that a violent inflammation of the whole eyeball is inevitable, and traces of chemosis are already present, the chances of the figure of the eye being lost in the second stage are still greater, and as Beer observes, the surgeon will be fortunate, if he can now prevent a frightful morbid change of the organ.

In the treatment of the first stage, Beer describes the indications as being exactly the same as in common ophthalmy, except that no scarifications are necessary, unless the case change into a violent inflammation of the whole eyeball. However, great promptitude in the application of proper curative measures is here particularly called for, as the least delay is apt to cause either a total loss of sight, or at least a serious impairment of it. (*Beer.*)

With few exceptions, the treatment of the second stage is also like that of ophthalmy in general. Warm poultices, Beer says, can only be employed with great circumspection. When matter collects in the anterior chamber, Beer strongly condemns making an opening in the cornea, by which practice, he states, that the eye would certainly be rendered quite deformed. He recommends leaving every thing to the absorbents, the action of which is to be invigorated by general and local remedies. Poultices are now to be laid entirely aside, and the effect of warmth tried. Blisters are to be applied alternately behind the ear and on the temple. The eye is to be smeared with the vinous tincture of opium, two or three times a day, by means of a camel-hair brush, or even four times, when the anterior chamber is filled to the extent of one half of it. Beer's experience leads him to approve of opening the cornea only in very urgent cases, that is to say, when the eye is so distended with matter, that the cornea is in a state of an abscess, which threatens to burst. In one part of his observations, Beer describes the matter in these instances as fluid; a point on which he differs from Scarpa: but he afterward confesses, that when an opening is practised, the matter must not be expected to flow out immediately like that of a common abscess. For further information on this subject, see *Hypopium*.

Idiopathic Iritis. The following is Beer's description of the disease. Together with an obtuse, heavy, deep pain in the eye, producing a sensation, as if the eyeball were continually pressed upon by one of the fingers, a manifest and incessantly increasing uniform contraction of the pupil takes place, as well as a gradual diminution of the movements of the iris; yet the pupil neither loses its circular shape, nor changes its position in the eye, and at the same time, an intolerance of light commences. When the pupil is examined with a glass, it is found to have already lost the shining blackness, which is peculiar to it in the healthy state. While these changes are occurring in the pupil, the colour of the iris undergoes a material alteration, first at its lesser circle, which grows much darker, and afterward at its greater circle, which turns greenish, when it was gray or blue, but reddish when it was brown or black. At the same time, the margin of the pupil becomes indistinct, and appears not so sharp as natural. As soon as the greater ring of the iris has undergone a considerable change of colour, this membrane becomes evidently swelled, and projects towards the cornea, so that the anterior chamber is very much lessened. As early as the period when the contraction of the pupil, and the immobility of the iris, are observable, a serious diminution of the power of vision occurs; because, in all cases, the inflammation extends more or less over the anterior layer of the crystalline capsule, and afterward, when the case is somewhat more advanced, says Beer, one may perceive quite plainly, with the unassisted eye, those effects of inflammation on the capsule, which have been so excellently described by Professor Walther. (*Abhandl. aus dem Gebiethe der Practischen Medicin*, 1 *B. Landshut*, 1810.) In proportion as the inflammation makes progress, the pain grows more severe and extensive, and towards the end of the first stage, it shoots particularly up to the top of the head; a circumstance strikingly proved whenever any thing like slight pressure aggravates the pain in the eye. The redness perceptible in the eye during the whole of the first stage is inconsiderable, and seems to be not at all proportioned to the violence and danger of the inflammation; for the sclerotica is only of a rose-red colour, and even this pale redness fades towards the circumference of the eyeball. (*B.* 1, *p.* 434.)

According to Beer, idiopathic iritis is always attended with a corresponding general disturbance of the system; but a good deal depends upon whether the inflammation spreads immediately to the deeper textures of the eye, or to its outer coats, or in both directions at once. In the first case, the constitutional indisposition is always more severe, and the danger of the disease increases every moment; in the second instance, the augmentation of the general symptoms is less striking; but in the third, the inflammation, and the corresponding febrile symptoms soon rise to such a pitch that the possibility of preserving the eyesight becomes very doubtful. The continued operation of hidden exciting causes, neglect, and erroneous management of the disease, also produce considerable differences; and, as Beer observes, it not unfrequently happens that a genuine idiopathic iritis, which does not appear at first very dangerous, nor rapid in its progress, will suddenly change, under the unfortunate concurrence of the circumstances, above alluded to, into a complete inflammation of the whole eyeball, destroying the organ in a few days, unless the most efficient treatment be speedily adopted.

In the second stage, says Beer, in conjunction with a corresponding still more manifest general indisposition, the pain in the eye grows very irregular; luminous appearances flash within the organ, and seriously annoy the patient, especially in the dark, while the power of seeing the external light undergoes a great decrease: the redness, even in the conjunctiva, increases; and the pupil, which hitherto has been perfectly circular, becomes more or less angular. At these angles, something of a light grayish colour may be seen projecting behind the pupillary edge of the iris, and on examination with a glass, plainly appears to be a very delicate layer of coagulating lymph, by which, first the lesser ring of the uvea, and (if proper treatment be not expeditiously employed) also its greater ring, are soon rendered adherent to the anterior portion of the capsule of the lens, (*synechia posterior*,) which membrane, as the disease advances, becomes more and more deprived of its transparency. Under these circumstances, it is evident, that the power of vision must daily decline, and that if this process of the effusion of lymph and its organization be not resisted by powerful measures, the patient will soon be left just capable of faintly distinguishing the light. While the above-described changes are taking place between the uvea and anterior position of the capsule, very peculiar effects are occurring in the anterior chamber; for, as the iris continues to project further towards the cornea, the latter membrane grows less and less transparent, and the iris seems as if concealed in a mist, at the same time that a small, yellowish, red, round prominence is formed at one or more places together, generally between the greater and lesser rings of the iris, and proves afterward to be a small abscess, which ultimately bursting, pours its contents into the anterior chamber, and thus occasions a true *Hypopium*. For several days, the flakes of the burst little cyst, still connected with the iris, may be seen floating in the aqueous humour, until they gradually disappear. When there is not merely one, but several of these little abscesses, says Beer, the greater part of the anterior chamber may be filled with matter, so that little more of the iris can be distinguished. In weak subjects, at this period of suppuration, blood may not unfrequently be perceived in the chamber of the eye; a circumstance regarded by Beer as a very unfavourable omen, in respect to the recovery of sight, as in such cases, portions of blood and matter are apt to lie in the posterior chamber entangled in the lymph. According to the same author, the matter in the anterior chamber is at last absorbed; the pupil, if it has been concealed, can again be seen, but it appears angular and very turbid; and in consequence of the layer of lymph in the posterior chamber, the eyesight is exceedingly diminished, or even reduced to the mere power of knowing light from darkness. Such, says Beer, is the course of the second stage of idiopathic iritis, when the inflammation has not extended far beyond its proper focus, and has been principally confined to the iris, corpus ciliare, the lens and its capsule, and the anterior part of the sclerotica. But if it should spread more deeply to the vitreous humour, the retina, the membrana Ruyschiana, and the choroides, symptoms of internal ophthalmy (strictly so called) then occur with great vehemence in the first stage, and at the termination of the second, the eyesight is for ever certainly destroyed in such a degree, that not the least perception of light remains; and even if the patient should think that he can distinguish it, the feel is only a deception; a developement of light within the eye itself; of which the surgeon may easily assure himself by placing the patient with his back towards the light, and asking him to point out where it is; or by putting him directly opposite a window, and moving the hand slowly along before his eyes; of which proceeding the patient will be quite unconscious. The effects left in the eye after such an iritis, and indicating its mischievous extension, are so characteristic, that, on the first inspection of the eye, no surgeon can entertain a doubt of the deeper textures of the eye having been involved in the inflammation. But when idiopathic iritis extends rather to the external, than the deep textures of the eye, the swelled iris, as early as the end of the first stage, approaches so near the cornea, which grows less and less clear, that they seem as if they were adherent, ere the second stage has commenced. And, indeed, on the accession of this stage, they actually adhere together at every point, either directly, or with the intervention of a mass of coagulating lymph. In the first event, at the end of the second stage, the cornea forms a conical protuberance, and a total staphyloma arises; (see *Staphyloma;*) but in the second, the cornea is said not to undergo this change. On the contrary, it becomes rather flat, and on account of the layer of organized lymph, which fills up the space between the cornea and iris, little of the latter membrane can be discerned, and what can be seen, appears to have its organization entirely subverted. When idiopathic iritis in its first stage extends its effects directly over the whole eyeball, the eye becomes nearly or quite destroyed in the same manner as in cases of violent acute ophthalmy.

The causes which give rise to idiopathic iritis, must always be such as operate directly upon the iris; and, hence, the disorder is usually a consequence of injuries and wounds of the eye, produced by accident, or in operations. And, says Beer, although rheumatic inflammation of the eye, when neglected, or wrongly treated, may at length affect the iris, and adjacent textures, yet such an iritis is but a secondary effect, derived from the pre-existing rheumatic ophthalmy. All injuries in which the weapon, or instrument, has more or less pressed against, pushed, irritated, or violently bruised, or torn, the iris itself, and all largish wounds of the cornea, are to be accounted the principal exciting causes of idiopathic iritis. Hence, extraction of the cataract is not unfrequently followed by this inflammation, when the flap of the cornea is kept too long opened, and the iris is hurt with any blunt instrument; when the incision in the cornea is too small, and a hard cataract pushes the iris between the lips of the wound, and is slowly pressed out of the eye; when many pieces of the cataract break off, and it is necessary repeatedly to introduce Daniel's scoop for their removal; or when, notwithstanding the operator proceed with the utmost delicacy, the patient is excessively timid, and unmanageable, or particularly irritable and prone to inflammation. This form of iritis is also produced by couching, reclination through the sclerotica, keratonyxis, and operations for artificial pupil. Nor, as Beer observes, is it at all surprising, that iritis should follow these last operations, as the surgeon has often to meddle with an iris that has been already violently inflamed.

Prognosis in the first stage. Serious as the disorder always is; important as the textures are, in which the inflammation is most severe; and quickly as vision may be for ever annihilated by it; yet, says Beer, the prognosis, in the first stage, is very favourable, when the true nature of the case is at once understood, and treated as it ought to be. The prognosis is the most favourable when the inflammation is not extensive; but it must be very reserved, when the inflammation extends either deeply backward, forward, or in both directions. Beer remarks, that, when iritis is purely idiopathic, and judiciously treated in its first stage, it is incredible with what rapidity its effects recede. When it is produced immediately by an injury of the iris itself, and some part of this membrane is torn, the risk of the inflammation is not the only thing for consideration; for the chance of the function of the iris being permanently impaired by the injury must also be taken into the account. And, says Beer, as in these severe injuries of the eyeball, it is impossible to foretell what may be the result of the traumatic inflammation, it is a good maxim always either to defer making any prognosis, or to deliver only a doubtful one. When idiopathic iritis has already changed either into a complete internal ophthalmy, or into a violent inflammation of the whole eyeball, no incautious promises should be made about the recovery of the eyesight, or even about preserving the shape of the eye. (*Beer.*)

Prognosis in the second stage. Though, says Beer, this is much less favourable than in the first stage, yet if proper measures be not deferred, a perfect recovery of the eye may often be effected. Here a great deal depends upon the state of the layer of lymph effused in the posterior chamber, and of suppuration. If it be plain to the naked eye, that no coagulating lymph lies in that chamber behind the contracted pupil, but slight grayish filaments are discernible with a magnifying glass, projecting only a little way from behind the pupillary edge of the iris; if the colour merely of the lesser circle of the iris be changed, while no little cyst of matter is yet formed on the latter membrane, and the sight is lessened only in a small degree, being somewhat cloudy; the complaint may be so completely cured by proper means, that not a vestige of it will remain. However, for some time after the termination of the second stage, the motions of the iris will be more sluggish than natural, though the pupil effectually adapt itself to the variations of light. On the other hand, when a considerable, though fine, web-like membrane can be plainly seen behind the pupil; when the colour of the larger circle of the iris is somewhat altered; and the power of vision is seriously lessened; though, by effectual treatment, the sight may be re-established sufficiently to enable the patient to read and write; yet, says Beer, it will for ever continue weak; the pupillary edge of the iris will never regain its perfect freedom, but constantly remain more or less angular; and the pupil never assume again the clear shining blackness, which in persons not of great age it naturally exhibits. Still more remarkable are the sequelæ of idiopathic iritis, when a small cyst of matter has been formed on the iris, and discharged its contents into the anterior chamber; for, in this case, under the best circumstances, the former colour of the iris never entirely returns. According to Beer, when at the first visit of the surgeon, vision is quite interrupted by the effusion of lymph in the posterior chamber, so that the patient can no longer perceive any object with the affected eye, though capable of distinguishing the light, and the outlines of some things; when the pupil is at the same time very contracted, and the colour of the greater circle of the iris entirely changed; there is no hope of recovery of the sight at first, though some chance of benefit may be subsequently afforded by the formation of an artificial pupil. If, says Beer, in such a case, matter has been effused from several little suppurating points of the iris, so copiously into the anterior chamber, that nearly all this cavity, or at least the half of it, is filled up, though after absorption some power of distinguishing light may return, little or no hope can be entertained of any effectual benefit from a future operation for an artificial pupil. When, at the termination of the first stage, the cornea is so severely inflamed, that the iris almost touches this membrane in its untransparent thickened state, all prospect of saving the eyesight is over, and it will be fortunate if the natural shape of the eye can now be preserved, and the formation of a staphyloma of the cornea prevented. When the layer of lymph between the cornea and the iris is extensive, and considerable blood-vessels can be seen proceeding into it from the iris, Beer says, nothing will succeed in re-establishing vision. And he observes, that, when an idiopathic iritis, at the close of its first stage, has changed into a true internal ophthalmy, and the pupil is already quite blocked up, so that even the light cannot be distinguished, the recovery of sight is quite impossible, and the surgeon must make every exertion to prevent the shape of the organ from being destroyed. In this disease, says Beer, a relapse, even when the inflammation has not been very considerable in the first attack, almost constantly ends in partial or complete blindness of the affected eye, as the progress of the case is so rapid, that there is not time enough to render effectual assistance.

Beer directs idiopathic iritis to be treated in its first stage like a case of pure internal ophthalmy, the practice being somewhat modified, however, according to the direction and degree in which the inflammation has spread, when the surgeon is first consulted. When the inflammation continues a good while limited, or spreads but very gradually to the outer texture of the eyeball, general and local antiphlogistic remedies are to be employed with moderation; but if it immediately extend itself to the innermost parts of the eye, or both inwards and outwards together, and threatens to end in an universal inflammation of the eyeball, antiphlogistic treatment must be most rigorously adopted. (*Beer.*) This author then notices the unfortunate state of the case, when, towards the end of the first stage, the eyesight happens to be entirely destroyed, the iris is close to the cornea, and there is danger of a staphyloma. In this desperate state of things, his apprehensions of this last disease lead him to suggest a plan, (the propriety of which I regard with much suspicion,) which is nothing less than actually trying to increase the inflammation, by stimulating the eye several times a day with laudanum, sulphuric æther, &c. with the view of doing what? Why, of obliterating the sources of the aqueous humour! the continuance of the secretion of which is set down as one of the essentials to the production of staphyloma. (*B.* 1. *p.* 447.)

The treatment of idiopathic iritis in its second stage, as recommended by Beer, is on the whole, both generally and locally, like what has been advised for the same stage of pure internal ophthalmy; but here, he says, it is necessary to pay particular attention to the direction, in which the inflammation extends itself in the first stage, so that the treatment may be regulated with greater precision. Beer also advises great attention to be paid to the effusion of lymph in the posterior chamber; as towards the end of the second stage, much may be done which would afterward be too late. Thus, when the surgeon perceives towards the end of the second stage, that the layer of lymph in the posterior chamber does not completely prevent, though it seriously diminishes vision, and that it is likely to remain in the same state, after the termination of the second stage, Beer recommends topical applications to the eye, and if these prove unavailing, internal alterative medicines, and even mercury, which, he says, when the treatment is judiciously conducted, ought not to be omitted. Here, also, he observes, another deviation must be made from the usual practice in the second stage of ophthalmy: calomel joined with opium, is to be exhibited with calamus aromaticus, bark, &c. Externally, Beer speaks highly of the benefit of a collyrium, containing the oxymuriate of mercury, without any mucilage, but with a considerable addition of the vinous tincture of opium. When these remedies cease to be efficacious, or the eye cannot bear fluid applications, as is sometimes the case, Beer recommends a bit of the following salve to be smeared once a day, between the edges of the eyelids, and allowed slowly to melt there, and become diffused over the eye: ℞. Butyri recentis insulsi ʒij. Hydrargyri nitrico-oxydi rubri gr. vj. Extract opii gr. viij. M Beer also states that rubbing a little mercurial ointment, with which some opium is blended, once a day into the eyebrow, will greatly promote the removal of the lymph effused in the posterior chamber. (*B.* 1, *p.* 450.)

Excellent as Beer's description of idiopathic iritis certainly is, there are some imperfections in his method of treatment. 1st, It does not appear to me, that he insists sufficiently upon the necessity of taking away a very large quantity of blood at the commencement of the case, and of repeating the general and topical bleeding, until the circulation is duly lowered, and the violence of the inflammation checked. 2dly, Though his recommendation of rigorous antiphlogistic treatment implies the approbation both of bleeding and cathartics, he says nothing of the use of moderate doses of tartarized antimony, in weakening the pulse; a practice highly praised by the late Mr. Saunders. (*On some Practical Points relating to Diseases of the Eye, p.* 26, *8vo. Lond.* 1811.) 3dly, If mercury has the power of arresting acute inflammation of the iris, "both prior to, and after, the effusion of adhesive matter," and of rapidly removing, "by an excitement of the absorbing system, peculiar to itself, the newly-effused matter, (*Travers, Synopsis, &c. p.* 291,) then Beer must delay too long the employment of this powerful medicine, since he does not commence its use until the close of the second stage, when he has found, that the absorption of the effused lymph cannot be effected by other means. 4thly, Beer entirely overlooks the important utility of belladonna and hyosciamus in producing a dilatation of the pupil, whereby adhesions of the iris to the capsule of the lens, or to the cornea itself, may frequently be prevented, or their ill effects considerably lessened. Belladonna, (says Mr. Saunders,) "if properly applied to the eye, during the adhesive process of inflammation, will cause the inner margin of the iris to expand, and recede from the axis of the pupil, and will thus overcome the restraint arising from the agglutination of lymph, by elongating the organized bands, which connect the iris and capsule, if they have not been of long duration. Thus, the adhesions are drawn out to a degree of tenuity, and consequently transparency, and a considerable quantity of light is admitted. If the effect of the inflammation has been slight, the adhesions will be trivial, and the pupil only slightly irregular. The iris will retain a certain power of action, and vision will be very little injured. In general, the pupil is misshapen, and the iris perfectly fixed; but, if the aperture be of sufficient size, and the capsule not rendered too opaque, the patient will enjoy a very useful degree of sight." (*Saunders, p.* 32.) Respecting belladonna, it is observed by Langenbeck, that, as all applications directly to the inflamed eye itself are frequently hurtful, and render it still more painful and irritable, it is a good plan to let the extract of belladonna be smeared upon the eyebrow, instead of putting a solution of it immediately in contact with the conjunctiva. (*Neue Bibl. B.* 2, *p.* 236.) The same author expresses his attachment to Beer's method of rubbing mercurial ointment with opium into the eyebrows; and, after dwelling, with due force, on the necessity of copious and repeated bleedings, leeches, evacuations, &c. he cautions practitioners not to be led into the supposition, that the efficacy of belladonna will supersede the occasion for taking away blood. He even declares, that, during the first vehemence of the inflammation, the application is quite inefficient, and that it frequently will not succeed in producing a dilatation of the pupil, before bleeding has been practised. "If, (says Langenbeck,) bleeding is to be useful in iritis, it must be copious, and often repeated."

Specific Cases of Iritis. The foregoing observations refer to idiopathic iritis, or inflammation of the iris uncomplicated with any specific disease. But there is an iritis, which "appears in company with rheumatism of the chronic form; sometimes with gout; with the constitutional signs of the lues venerea; and during, or following, the action of mercury upon the system." (*Travers, Surgical Essays, Part* 1, *p.* 59.)

Mr. Hunter entertained doubts, whether any inflammations of the eyes are syphilitic, and he appears to found his opinion upon two circumstances; one is, that, if such cases be venereal, the disease is very different from what it is when it attacks other parts, and is attended with more pain than venereal inflammation, arising from an affection of the constitution: the second is, that he never saw these cases, attended with such ulceration, as occurs when the complaint invades the mouth, throat, and tongue. (*Hunter on the Venereal Disease, p.* 324.) On the other hand, the generality of modern surgeons believe in the reality of venereal ophthalmy, though their accounts of the symptoms and appearances of the complaint are in some respects discordant. Scarpa says, the venereal ophthalmy is peculiar in not discovering manifest signs of inflammation, stealing on clandestinely, *without much uneasiness.* It afterward relaxes the vessels of the conjunctiva and lining of the palpebræ, and changes the secretion of Meibomius's glands. In time it causes ulceration of the margins of the eyelids; the ciliæ fall off, and the cornea grows opaque. In the worst stage, it excites itching in the eyes, which is exasperated at night, and abates in violence towards morning, as do almost all the effects of syphilis. It never attains the state of chemosis. With the exception of the venereal ophthalmy, in the form of iritis, I cannot discover, that any thing very certain has yet been made out. By this observation, however, it is not meant to assert, that cases, corresponding to Scarpa's description, do not present themselves, and may not be relieved by his method of treatment; but, that their venereal character is not fairly proved. In examples, like those described by Scarpa, the decoct. sarsap. the oxymuriate of mercury; mezereon; guaiacum; and even mercurial frictions, may be employed, with leeches and blisters. Scarpa particularly recommends a collyrium, made with the oxymuriate of mercury. When the eyelids are ulcerated, the unguentum hydrargyri nitratri, weakened at first with twice or thrice its quantity of the unguentum cetaceum, is the best topical application.

The iris is now supposed to be more liable than any other part of the eye, to venereal inflammation. (*Wardrop's Essays on the Morbid Anat. of the Eye, Vol.* 2, *p.* 36.) The case is mentioned by Mr. Saunders, who recommends the vigorous exhibition of mercury, and the use of belladonna. Its symptoms and treatment, however, have been more particularly detailed by Beer. (*Lehre von den Augenkr, B.* 1, *p.* 653.) As this case, and some other specific forms of iritis, are described in the first vol. of the last edition of the First Lines of Surgery, I need here only refer the reader to that volume, and to a few works containing additional information on iritis in general; as *Saunder's Treatise on some Practical Points, relating to Diseases of the Eye. p.* 21, 8*vo.* 1811; *and particularly the latter editions, in which the utility of mercurials is noticed. Beer's Lehre von den Augenkr. B.* 1, 8*vo. Wien.* 1813.

In the article *Hypopium,* I have referred to an early case, in which the quick exhibition of mercury and its good effects were exemplified in Germany. But whatever claims the continental surgeons may have respecting the first administration of mercury in iritis, I believe it a justice due to Dr. Farre and Mr. Travers to state, that these gentlemen have undoubtedly given not only the best practical directions on the subject, but laid the greatest stress upon the necessity of the practice, establishing the efficacy of mercury, as a means *as well of resisting the effusion of lymph* in the eye, as of exciting the absorption of it, after it has been effused. (See *Travers, in Surgical Essays, Part* 1.) Consult also *J. Vetch, A Practical Treatise on the Diseases of the Eye, p.* 88, *&c.* 8*vo. Lond.* 1820. *Weller's Manual of the Diseases of the Human Eye, Trans. by Monteath,* 8*vo. Glasgow,* 1821. *J. Wardrop, Morbid Anatomy of the Eye, Vol.* 2, *chap.* 20, 8*vo. Lond.* 1818. *H. B. Schindler, de Iritide Chronica, Vratislariæ,* 1819. *J. A. Schmidt über Nachstaar und Iritis nach Staar-Operationen,* 4*to. Wien.* 1801; a work of high repute. *Carmichael in Obs. on the Specific Distinctions of Venereal Diseases, p.* 31. *Quarterly Journ. of Foreign Medicine, Nov.* 1818.

Rheumatic Inflammation of the Eye. According to Mr. Wardrop, the albuginea acquires a brick-red tinge, or an admixture of yellow with crimson red, which colour, he supposes, is probably caused by the serous part of the blood being tinged with bile, "an effect, likely to take place from the marked derangement of the biliary organs, which usually accompanies this disease." Contrary to the statement of Beer, who describes the blood vessels as being in clusters, Mr. Wardrop observes, that they are generally equally numerous over the whole white of the eye, passing forwards in nearly straight lines from the posterior part of the eyeball, and advancing close to the cornea; but neither passing over it, nor leaving the pale circle around it, which is so striking when either the choroid coat, or the iris is inflamed. If the vessels be closely examined, the general redness will be found produced more by numerous small ramifications, than a few large trunks. There is frequently a little swelling of the conjunctiva, which sometimes forms a slightly elevated ring round the cornea. In mild cases, little change takes place in the anterior chamber in the early stage; but, as the disease advances, the cornea becomes dull and turbid. Upon close examination, one or more of the layers of the conjunctiva on the cornea will generally be found to be abraded especially towards its circumference. At the commencement of the disease, there is often a disagreeable feeling of dryness of the eye; but sooner or later, a very copious secretion of tears takes place. The eyelids are observed to be very little affected. At first, the chief seat of pain is generally in the head, though sometimes in the eyeball itself. Mr. Wardrop describes the pain as usually most severe in the temple of the affected side, but, he says, that it is often seated in the brow, the cheek-bone, the teeth, or the lower jaw. "Sometimes the pain is precisely confined to one half of the head, and sometimes there is a severe pain in the cavity of the nose, or in the ear. The pains are more of a dull agonizing kind, than acute, and though unceasing, they vary much in degree, coming on at times in very severe paroxysms, and with great violence, when the head is bent downwards. Sometimes the pain is excited by merely touching the scalp, and the patient is unable to rest his head on the affected side, or even lean it on a pillow. In most cases, the pain is said to be remittent, the paroxysm coming on in the evening, continuing during the night, being most severe about midnight, and abating towards morning.

In the eyeball, says Mr. Wardrop, the patient generally complains more of a sense of fulness and distention, than of pain; and, though there is a great degree of external redness, *the eye does not seem to suffer from exposure to light*; a point, on which Professor Beer delivers a directly opposite statement, at least, in relation to the first stage of the disease. However, these authors both agree in considering the sclerotica, as generally the chief seat of rheumatic inflammation; but Beer sets down the iris as likewise a subject to be attacked. He admits also, that in the second stage, the aversion to light undergoes a considerable diminution. According to Mr. Wardrop, rheumatic ophthalmy is always accompanied with more or less symptomatic fever, severe paroxysms of which take place toward evening, and the functions of the primæ viæ are much deranged, "the appetite being impaired, and the evacuation always changed in quality." In severe cases, the pain in the head soon becomes agonizing, the redness of the eyeball increases, the whole white of the eye is crowded with blood vessels, and the conjunctiva swelled. At length ulceration commences in the cornea, through which the aqueous humour is discharged, and the eyeball collapses, when all pain ceases; or abscesses may form within the posterior chamber, and burst through the sclerotic coat. (*Wardrop, in Med. Chir. Trans. Vol.* 10.) Beer describes small watery vesicles as forming on the cornea, or white of the eye, and changing during severe pains into small ulcers, which occasion an appearance, as if a small piece were torn out of the surface of the cornea. He adds, that they seldom leave scars behind; but generally little pits, which are soon filled up in healthy subjects. (See *Weller on Diseases of the Eye, Vol.* 2, *p.* 217.)

The causes of rheumatic ophthalmy, enumerated by writers, are change of weather, variation of temperature, exposure to damp, a cold current of air directly striking the eye, and a constitution disposed to rheumatism. Mr. Wardrop states, that both sexes are equally subject to the disease; but that he has observed it most frequently in adults, and persons of rather advanced age. Only one eye is usually affected; and when the second is attacked, the disease is almost always less severe in it, than that which is first inflamed.

According to Mr. Wardrop, rheumatic ophthalmy resembles syphilitic more than any other kind of inflammation of the eye. But, he notices, that, *in rheumatic ophthalmy, the proper vessels of the sclerotic coat are enlarged,* which is the cause of the redness being generally diffused over the whole albuginea, whereas *in syphilitic inflammation, it is the anterior ciliary arteries, passing along the sclerotica on their way to the iris, which are chiefly affected*; and hence the pale ring, which is always observed between the cornea and the enlarged vessels. Mr. Wardrop further explains, that though these diseases resemble each other in the pains round the orbit, and their evening exacerbation, *patients, with syphilitic ophthalmy always have the constitutional symptoms of syphilis.*

When the disease has made much progress, and the symptoms have not yielded to other remedies, Mr. Wardrop recommends the evacuation of the aqueous humour, as a practice, from which the most beneficial effects may be expected. After the operation, fomentations are the only necessary applications; but, if the eye continue long irritable, the vinous tincture of opium is to be used.

Mr. Wardrop enjoins attention to the state of the biliary organs in every stage of the disease, and speaks highly of the sudden relief sometimes afforded by an emetic, care being taken to empty the bowels afterward with calomel and rhubarb, or other purgatives. If the functions of the skin were suddenly interrupted by a chill just before the attack, this author prescribes a couple of grains of antimonial powder, alone, or combined with opium, to be taken every four or six hours. Little advantage, he says, is derived from local bleeding, and where venesection may become necessary, on account of the complaint resisting other means, it is to be practised with moderation.

In the early stage, Mr. Wardrop has found, that the pain in the eye and eyebrow are sometimes much alleviated by a fomentation with the decoction of poppy-heads. He also praises blisters to the nape of the neck, or behind the ear; but, disapproves of their being put near the eye itself. The vinous tincture of opium, he says, is the only local application which he has ever seen decidedly beneficial; but, its use is to be deferred, till a late stage of the inflammation, when all febrile symptoms have been subdued. "After the primæ viæ have been well evacuated, the tongue may still remain very white, and the pulse quicker than natural." In this state, small doses of bark, either alone, or with the mineral acids, will be most serviceable. (*Wardrop in Med. Chir. Trans. Vol.* 10.) The outlines of Beer's practice may be given very briefly: in the first stage, he applies a leech to the inner canthus, and covers the eye with a cold poultice, with a small proportion of vinegar in the water, with which it is made. Diaphoretics are also prescribed. In the second stage guaiacum, camphor, arnica, antimonials, blisters to the neck, or behind the ears, frictions with opium over the eyebrows, and covering the eyes with bags of aromatic herbs and camphor, are the means of the relief. When abrasions, or ulcerations exist on the conjunctiva, sclerotica, or cornea, a collyrium of the lapis divinus, with a large addition of the vinous tincture of opium, is commended; or if the ulcers are large, and on the cornea itself, they may be touched with the latter tincture by means of a camel-hair pencil. After each use of the collyrium, Beer covers the eye again with the bags of aromatic herbs and camphor. (See *Weller on Diseases of the Eye, Vol.* 2, *p.* 218.) Respecting the last application, I have already expressed my belief, that it is one which is not likely to obtain credit among English surgeons.

Scrofulous Ophthalmy. According to Mr. Travers, the inflammation of the conjunctiva, termed *strumous*, when it has not proceeded to a change of texture, is not marked by any prominent local character." The vascularity is inconsiderable. This inflammation sometimes accompanies pustule of the sclerotic conjunctiva, in which case, the vascularity is diffused, instead of being partial, as in pure pustular inflammation, and the *intolerance of light, characteristic of the strumous inflammation*, is present in a greater or lesser degree. It accompanies also the morbid secretion of the lids, when the eyeball becomes affected by the acuteness and duration of that disease, and the pustule on the cornea, especially the variolous pustule. In its simplest form, it is almost peculiar to young children, stationary, marked by a very slight redness of the sclerotic conjunctiva, and the greatest possible degree of intolerance (*of light*.") The same author attributes the disease to a morbid sympathy of the retina with the secreting surfaces of the primæ viæ and skin. The following is the treatment, proposed by Mr. Travers for each form of scrofulous ophthalmy:

1. *Strumous inflammation, without change of texture, vascularity more or less, intolerance (of light) excessive.* Calomel and opium, at night; emetic tartar to continued nausea; gentle alvine evacuants; diaphoretic drinks; large open blister on the nape of the neck; leeches; tepid bath; tepid or cold water washes, as most agreeable; vapour of opium; large bonnet shade; no bandages; spacious airy apartments; and light bed-clothing.

2. *With recent diffused opacity of the corneal conjunctiva, and vessels raised upon and overshooting the corneal margin.* Calomel and opium to slight ptyalism; purgatives on alternate days; leeches; blisters alternated behind the ears and on the nape of the neck and temples. As the acute stage passes off, repeated circular sections of the vessels on the sclerotica, near the margin of the cornea.

3. *With herpetic ulcers of the cornea.* The same; blisters on the temples; as the inflammation yields, solut. argent. nitrat.; vin. opii; solut. cupr. sulph.; dilute zinc lotion.

4. *With pustules.* If partial, weak zinc, or alum lotion; ung. hydrarg nitrat.; occasional brisk purgatives; infusion of roses with additional acids; tonic bitters; columba; gentian, &c. blisters behind the ears, repeated if necessary; if the vascularity is diffused by the multiplication of pustules, or the duration of inflammation, with irritability to light, treatment as in strumous inflammation without breach. Ung. sub-acet. plumbi.

5. *With inflammation of the follicles and puriform discharge.* Active measures at first, but not long continued. Blisters; when becoming chronic, with thickened lids, scarifications; zinc, alum, or copper wash, dilute; ung. hydr. nitrat.; hydr. nitr. oxid.; sub-acet. cupri; tonics and sedatives; if obstinate, issue or seton.

6. *Convalescent state.* Infusion of roses; cascarilla; columba; decoction of bark; with dilute sulphuric, or nitric acid: steel, rhubarb, and soda; or magnesia, as aperients; tonic collyria and gently stimulant ointments; nutritive diet; country air; shower, or sea-bath, in the warm months. (*Travers's Synopsis, &c. p.* 92—260, *&c.*

When I look at the discordant accounts of what are called scrofulous affections of the eye, and the difference of practice laid down by different writers, I leave the subject with an impression, that the terms *scrofulous* and *strumous* are here employed as much at random as in any other cases, which can be specified. Indeed, the attempt to reconcile the various statements and descriptions of scrofulous ophthalmy, would puzzle the most able man in the profession: and it is with this belief, that I avoid contrasting the sentiments of Beer, Weller, Lloyd, and other modern writers with those already delivered. (See particularly *Beer's Lehre von den Augenkr. B.* 1, *p.* 588, *&c.; Weller's Manual of the Diseases of the Eye, Vol.* 2, *p.* 265, *&c.; and Lloyd on Scrofula, p.* 312, *&c.*)

The following observations explain the practice of Scarpa, and the late Mr. Ware.

No specific being known for scrofula, the treatment, in this instance, rather consists in preventing the aggravation, than in attempting the radical cure of the complaint. Every thing debilitating is hurtful, as all evacuations; indigestible food; intense study; a sedentary life; damp marshy habitations; uncleanliness; frequent transitions from heat to cold. On the other hand, observing to regulate the action of the bowels with the mildest laxatives; and the administration of bark, either alone or conjoined with the tinct. guaiaci ammoniata, do good. Alterative medicines, and especially æthiops mineralis, from gr. ss. to gr. xx. in the day, taken for a few weeks uninterruptedly; liquor calcis, in broth or gruel, at first, in the dose of ℥iij. at breakfast, and afterward the same quantity, twice daily for a few months; together with the uniform observance of a good regimen; may tend much to abbreviate the duration of this obstinate species of the disease. (*Scarpa.*)

Mr. Ware found, that the addition of xx to xxx gr. of the potassæ sulphas to each dose of bark, suffices to keep the bowels in a regular state, when there is a tendency to costiveness. In some cases, in which there was little appearance of inflammation, this gentleman found the eyelids so relaxed, and the eyes so irritable, that children would not open their eyes, even in the darkest room. In some of these relaxed cases, very beneficial effects were produced by administering internally small doses of opium, night and morning, to abate the irritability. Sea-bathing is always serviceable in scrofulous ophthalmy, and, probably the mere residence on the seacoast, and the respiration of the sea-air, may bring about some of those advantages, which have been exclusively attributed to bathing. Friction of the body with a fresh brush or flannel, should be employed morning and evening.

With regard to topical applications, those of a soft relaxing kind prove injurious, as also retirement in dark situations. Slightly astringent collyria; the ung. tutiæ, and the ung. hyd. nitrat. are proper when there are excoriations upon the eyelids, and when, from their occasional adhesion to each other, there is reason to suspect, that the sebaceous glands secrete an acrimonious fluid. Mr. Ware also found that one drop of the thebaic tincture, dropped into the eye, once or twice in the course of the day, contributed greatly, both to abate the irritability and to increase the strength of the relaxed vessels. (*On Scrofulous Ophthalmy, p.* 26.) The same gentleman occasionally mixed old verjuice with cold spring-water, at first, in the proportion of one part of the former to six of the latter, and sometimes increased the quantity of verjuice, until its quantity equalled that of the water. All coverings should be removed from the eyes, except a shade of green silk, and patients should be gradually habituated to a stronger light. Good air and exercise always tend to improve scrofulous constitutions, and thus, indirectly, the disease under consideration. Scrofula often disappears spontaneously, as children approach the adult state, and, if we only have it in our power to check its progress in the early stage of life, it seems to wear itself out afterward, and whatever local effects it may have produced, often disappear.

Chronic Ophthalmy. Unfavourable peculiarities are met with in practice, which prevent the complete cure of the second stage of acute ophthalmy, or that connected with a weak vascular action in the part affected; whence the protracted disease becomes purely chronic, and threatens the slow destruction of the eye.

These peculiarities may be chiefly referred to three causes: 1. To an increased irritability continuing in the eye after the cessation of acute inflammation. 2. To some other existing affection of the eye, or neighbouring parts, of which the chronic ophthalmy is only an effect. 3. To constitutional disease.

1. That chronic ophthalmy may depend upon a morbid irritability of the eye is evinced, not only from its resisting topical astringents and corroborants, to which the disease from simple relaxation and weakness yields, but from its being exasperated by them, and even by cold water. The patient complains of a sense of weight in the upper eyelid, and restraint in opening it; the conjunctiva has a yellowish cast, and when exposed to the damp cold air, or a brilliant light, or when the patient studies by candlelight, its vessels become injected and turgid with blood. If, in combination with such symptoms, the habit of body be weak and irritable; subject to spasms; hypochondriasis, &c. then, it is manifest, that the chronic ophthalmy is connected with a general impairment of the nervous system.

2. Besides extraneous bodies, lodged between the palpebræ and eyeball, the inversion of the ciliæ and hairs, growing from the caruncula lachrymalis; ulcers of the cornea; prolapsus of the iris; herpetic ulcerations of the margins of the eyelids; a morbid secretion from the Meibomian glands; a diseased enlargement of the cornea, or of the whole globe of the eye, &c. may occasion and maintain chronic ophthalmy.—It is only my part here to mention such remote causes; for, the particular treatment of them is described in other articles. (See *Cornea, Ulcers of; Iris, Prolapsus of; Lippitudo; Staphyloma; Hydrophthalmy; Trichiasis, &c.*)

3. The cure of the second stage of acute ophthalmy may be retarded by the prevalence of scrofula in the system; or by the small-pox affecting the eyes. According to Scarpa, chronic ophthalmy is also sometimes a consequence of lues venerea; but I know nothing certain on this subject, in addition to what has been stated in the foregoing columns.

When chronic ophthalmy depends upon

preternatural irritability, the internal exhibition of bark with valerian is proper; animal food of easy digestion; gelatinous and farinaceous broths; wine in moderation; gentle exercise; living in salubrious and mild situations; are all severally productive of benefit. Externally, the applications should be of a sedative and corroborant kind; such as aromatic spirituous vapours (from the *spiritus ammon. comp.*) applied to the eye through a funnel, for half an hour, three or four times a day; and the eyelids and eyebrows may also be rubbed with the linimentum camphoræ.

Patients, both during the treatment and after the cure, must refrain from straining the eye, and, immediately the least uneasiness is felt, must desist from exercising it. When they write or read, it should constantly be in a steady, uniform light, and too little, as well as too much exercise of the organ, aggravates the disease. Having once begun to wear spectacles, they should never study or survey minute objects without them. (*Scarpa.*)

Intermittent Ophthalmy. It is the character of certain forms of ophthalmy, like the rheumatic and venereal, to be liable to periodical exacerbations; but I am not certain that there are any cases specifically claiming the name of *intermittent ophthalmy.* The late Mr. Ware, however, has noticed some examples, which intermitted, or at least, remitted at stated periods. In these, he did not find bark so useful, as in scrofulous ophthalmy; but he had seen the most beneficial effects produced by the oxymuriate of mercury, sometimes joined with the compound decoction of sarsaparilla. (See *Ware on Intermittent Ophthalmy.*)

Variolous Ophthalmy. As the small-pox inoculation has at present almost generally been abandoned by the faculty in favour of the vaccine disease, there seems less occasion now for detailing circumstantially a very obstinate species of ophthalmy, induced by the former complaint. When the small-pox eruption is very abundant in the face, it causes a considerable swelling of this part of the body; the eyelids become tumefied, the eyes redden, and there ensues a discharge of a very thick adhesive matter, which agglutinates the palpebræ together; so that if no steps be taken, the eyes will continue closed for several days in succession. The matter, confined between the eyelids and globe of the eye, being perhaps of an irritating quality, and injurious from the pressure it occasions on the surrounding parts, seems capable of exciting ulceration of the cornea, and even of irremediably destroying vision. When the pustules of the small-pox in other parts of the body have suppurated, they cicatrize; but those, which happen within the margin of the cartilage of the eyelids, are prevented from healing by the diseased secretion, which is then made from the Meibomian glands, and such ulcers result, as will sometimes last for several years, and even during life, if unremedied by art. (*St. Yves sur les Mal. des Yeux, p.* 216, *Edit.* 12*mo.*) After the employment of the antiphlogistic treatment, should the disease, when treated with topical astringents and corroborants, yet baffle the efforts of the surgeon, setons in the nape of the neck, kept open for a long while, prove one of the most useful remedies. Scarpa has experienced much advantage from giving every morning and evening, to a child, ten years old, a pill, containing one grain of calomel, one grain of the sulph. aur. antim. and four grains of cicuta in powder. It is obvious, that so potent an alterative, if ever serviceable in this case, will soon evince its efficacy; nor would it be justifiable to sport with the patient's constitution by continuing its use beyond a certain period, unless sanctioned by evident signs of its salutary effects on the disease of the eyes.

When great irritability prevails, a mixture of three drams of the vinum antimoniale, and one dram of the tinctura thebaica, given in doses of five or six drops, in any convenient vehicle, and at the same time, applying externally the vapours of the spiritus ammon. comp. to the eye, constitute an excellent plan of treatment. In other cases, saturnine collyria, with a little camphorated spirit of wine, or white wine, in which a little sugar is dissolved; tinct. thebaica; Janin's ointment, &c. avail most. This treatment is also applicable to the chronic ophthalmy from measles.

When inveterate ulcers remain upon the edges of the palpebræ, the disease may then be regarded as the psorophthalmy, described by Mr. Ware, and will demand the same method of cure. (See *Psorophthalmy.*)

Operation of discharging the aqueous humour. To this practice, some allusion has been already made in the preceding columns; and as the proposal is intended to apply to several forms of inflammation of the eye, I have not given any particular account of it in treating of the various cases. Mr. Wardrop remarked, that if the eye of a sheep, or ox, be squeezed in the hand, the whole cornea instantly becomes cloudy, and whenever the pressure is removed, this membrane regains its transparency. From this curious phenomenon in the dead eye, it was evident that, in the living body, the transparency of the cornea might vary according to the degree of its distention; and that, in cases of opacity of the cornea, accompanied with fulness of the eyeball, its transparency might be restored by the evacuation of the aqueous humour. The cornea is little sensible, and, as every body knows, its wounds are free from danger. Mr. Wardrop soon met with a case, favourable for making the experiment; the cornea was milky and opaque, and the eyeball distended and prominent, attended with acute inflammatory symptoms. The aqueous humour was discharged by a small incision, and the operation produced not only a removal of the cloudiness of the cornea, but an abatement of the pain, and a sudden check to all the inflammatory symptoms. From the success of this case, Mr. Wardrop was led to perform the operation on others, not only with a view of diminishing the opacity of the cornea, but also of alleviating the inflammation. Four interesting cases are related by this gentleman, very much in favour of the practice, when the eye is severely inflamed, attended with fulness of the organ, a cloudy state of the cornea, and a turbidness of the aqueous humour. Mr. Wardrop also advises the operation, whenever there is the smallest quantity of pus in the anterior chamber, accompanied with violent symptoms of inflammation. He thinks, that the great and immediate relief, which the method affords, is imputable to the sudden removal of tension; and he performs the operation with a small knife, such as is used for extracting the cataract. The instrument is to be oiled, and introduced so as to make a wound of its own breadth, at the usual place of making an incision in the extraction of the cataract. By turning the blade a little on its axis, the aqueous humour flows out. (See *Edinb. Med. and Surg Journal. Jan.* 1807; *also Med. Chir. Trans. Vol.* 4.) The late Mr. Ware approved of Mr. Wardrop's operation in the *epidemic, purulent*, or *Egyptian ophthalmy*, when, notwithstanding general evacuations, topical bleeding, mildly astringent lotions, and a strict antiphlogistic regimen, the symptoms still continue, and especially, if the cornea begin to lose its transparency, and a white rim appear round its circumference. Mr. Ware did not object to using a small knife, of the kind employed in extracting the cataract; but preferred a lancet, or a sharp-pointed couching needle, with a blade somewhat wider than usual, and a groove in its middle. The instrument, he advises, to be introduced about one-tenth of an inch before the connexion of the cornea with the sclerotica, and pushed gently on, parallel to the plane of the iris, until the aqueous humour makes its escape. (*Ware on the Purulent Ophthalmy, p.* 41, 1808.) As already explained, Mr. Wardrop also recommends this practice in certain states of rheumatic ophthalmy. Consult *Avicenna, Canon L.* 3, *Fen.* 3, *Tract.* 1, *cap.* 6. *Maître-Jan. Traité des Mal. de l'Œil*, 12mo *Paris*. 1722. *St. Yves, Traité des Mal. des Yeux, p* 176, *&c. Janin, Mém sur l'Œil, &c.* 8vo. *Paris*, 1772. *L. F. Gendron, Traité des Mal. des Yeux.* 2 *T.* 12*mo. Paris*, 1770. *C. F. Reuss, Dissertationes Med. 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OSCHEOCELE. (from οσχεον, the scrotum, and κηλη, a tumour.) A hernia which has descended into the scrotum.

*OSTEOSARCOMA, or OSTEOSARCOSIS. (from οστεον, a bone, and σαρξ, flesh.) This term signifies the change of a bone into a substance, of the consistence of flesh. Bones are sometimes converted into a soft, lardy, homogeneous substance, resembling a cancerous gland, and it is this affection, to which Boyer thinks, that the appellation ought to be confined.

Callisen seems also to regard the osteosarcosis as a disorder by which the texture of the bones is converted into a fleshy or fatty substance, accompanied with a tendency to carcinoma. (*System. Chirurgiæ Hodiernæ, p.* 204. *Vol.* 2. *Edit.* 1800.) We are to understand by osteosarcoma, says Boyer, an alteration of the osseous structure, in which, after more or less distention, the substance of the bone degenerates, and is transformed into a diversified mass, but, more or less analogous to that cancer of the soft parts; while the local and general symptoms still more strikingly resemble those of the latter disease. (See *Traite des Mal. Chir. T.* 3, *p.* 587.)

According to this writer, all the bones are liable to such a disease; but, it has been more frequently observed in the bones of the face, those of the base of the skull, the long bones of the limbs, particularly the ossa innominata, which are perhaps oftener affected than any other bones of the body. (*Op. cit. p.* 588.)

Foreign surgeons do not appear to entertain precisely the same ideas respecting cancer, which prevail in England: at least, they apply the term to many complaints in which there are no vestiges of a carcinomatous structure, and numerous diseases of an incurable nature receive abroad very indiscriminately the name of cancer. Thus, the French surgeons have not yet distinguished the strongly marked differences between carcinoma and fungus hæmatodes. (See *Roux, Parallèle de la chir. Angloise, &c.*; and the article *Fungus Hæmatodes.*)

Fungous diseases in the antrum expand the bones of the face, make their way out, and present a frightful specimen of disease. This change of the bones, though known to have nothing to do with cancer, (see *Antrum*,) is considered by Boyer as a kind of osteosarcoma, proceeding from carcinomatous mischief in the neighbouring soft parts; and this he adduces as an example of his first species of osteosarcoma, or that arising in consequence of previous disease in other parts. In the second species, the disorder commences in the bones, and the soft parts are secondarily affected. In all cases, osteosarcoma comes on with deeply-seated pain, which sometimes lasts a considerable time before any swelling is manifest. Sometimes the pain becomes more and more afflicting, and of the lancinating kind, impairing the health even before there is any change in the form of the limb. At length, the swelling takes place, occupying the whole circumference of the member. Its nature and situation are in some measure indicated by its hardness and depth. It is unequal and tuberculated, as it were. Pressure does not lessen its size, nor make the pain worse. The soft parts are still in their natural state. The tumour, however, grows more or less rapidly, and the lancinating pains become more severe. In time, the soft parts themselves inflame, and become painful. Sometimes, the skin ulcerates, and, in this very uncommon case, the sore presents a cancerous appearance. Hectic symptoms are induced, the patient gradually loses his strength, and, at length, falls a victim to the disease.

The alteration, which the structure of the bones undergoes in the osteosarcoma, (says Boyer) deserves great attention. Most frequently, when the disease has made considerable progress, and the tumour has existed a long while, the bony texture has disappeared more or less completely; in lieu of it, an homogeneous, grayish, yellowish, lard-like substance is found, the surface of a slice of which is smooth, much like that of a very hard white of egg, or old cheese, the consistence varying from that of cartilage to that of very thick bouillie. The surrounding soft parts, which have participated in the disease of the bones are converted into a similar matter; muscles, tendons, periosteum, ligaments, vessels, cellular substance, all are confounded in the same homogeneous mass, and have undergone the same degeneration.

In some examples, the disease is less advanced: portions of the bone are then met with whose texture and consistence are nearly natural, and which are merely somewhat enlarged. But in proceeding towards the centre of the disease, the substance of the bone is found softened, and its consistence less than that of cartilage, still manifestly retaining, however, a fibrous texture; while more deeply, it is converted into a lard-like substance, resembling (says Boyer) that of parts affected with carcinoma. In these tumours, cysts are often found, sometimes containing a fetid ichor,—sometimes a matter like clear bouillie; and, in certain cases, a quantity of semi-transparent, tremulous, gelatinous matter is found in the middle of the lard-like substance. Boyer records an instance, in which nearly the whole humerus was changed into a gelatinous mass. (See *Leçons sur les Mal. des Os, T.* 1. *Chap.* 22.)

The prognosis of this disease must always be unfavourable; for, it is equally incurable, and disposed to bring on fatal consequences, whether Boyer's opinion, concerning its being cancer of the bones, be true or not. This author notices, that, even after amputation, the complaint almost always recurs. (*P.* 591.) The only chance of relief, however, obviously depends upon the possibility and success of the operation. In the *Traité des Mal. Chir. T.* 3, *p.* 594—605, Boyer records two cases of osteosarcoma; one of the thigh; the other, of the os innominatum. The first patient was saved by amputation. Some further particulars relative to osteosarcoma may be found in *Boyer, Traité des Maladies Chir, T.* 3; *Haller's Element. Physiol. T.* 8, *p.* 2, *pag.* 5; *S. A. Kulmus, Diss. de Exostosi Steatomatode Claviculæ; Gedan.* 1732; *S. F. Hundertmark, Diss. sistens Osteostealomatis Casum rariorem; Lips.* 1752; *S. G. Hermann, Diss. de Osteosteatomate, Lips.* 1767: *S. C. Plenck, de Osteosarcosi: Tub.* 1781. *&c. B. C. Brodie in Pathol. and Surgical Obs. on the Joints, p.* 301.

OZÆNA. (from οζη, a stench.) An ulcer situated in the nose, discharging a fetid purulent matter, and sometimes accompanied with caries of the bones. Some authors have signified by the term, an ill-conditioned ulcer in the antrum. The first meaning is that which mostly prevails. The disease is described as coming on with a trifling tumefaction and redness about the ala nasi, accompanied with a discharge of mucus, with which the nostril becomes obstructed. The matter gradually assumes the appearance of pus, is most copious in the morning, and is sometimes attended with sneezing, and a little bleeding. The ulceration occasionally extends round the ala nasi to the cheek, but, seldom far from the nose, the ala of which, also, it rarely destroys. The ozæna is often connected with scrofulous and venereal complaints. In the latter cases, portions of the ossa spongiosa often come away. After the complete cure of all venereal complaints, an exfoliating dead piece of bone will often keep up symptoms, similar to those of the ozæna, until it is detached. Mr. Pearson remarks, that the ozæna frequently occurs, as a symptom of the chachexia syphyloidea. It may perforate the septum nasi, destroy the ossa spongiosa, and even the ossa nasi. Such mischief is now more frequently the effect of the chachexia syphyloidea, than of lues venerea. The ozæna must not be confounded with abscesses in the upper jawbone. (See *Antrum*.)

The constitutional disease, on which the ozæna generally depends, and which acts as the remote cause, must be relieved, before a cure of the local effect can be expected. The internal medicines, which may be necessary, are preparations of mercury, and antimony; sarsaparilla, elm bark, Peruvian bark, muriated barytes, and muriate of lime. Sea-bathing may also do good, by improving the health. The best external applications are said to be, preparations of copper, zinc, arsenic, mercury, the pulvis sternutatorius, and diluted suphuric acid. (*Pearson's Principles of Surgery, Chap.* 12. *F. A. Mayer, Commentatio de Ozæna, Frank. Del. op.* 11.)

OYYMURIATIC ACID. Besides the nitrous and nitric acids, other medicines, containing a large proportion of oxygen, and easy of decomposition, have been recommended to be tried as remedies for the venereal disease; viz. oxygenated vinegar, oxalic acid, oxygenated muriate of potash, &c. (See *Caldwell's Medical Theses, Vol.* 1. *p.* 111.) But, perhaps, nothing has been put to the test of experiment with greater expectation of success, than the oxygenated muriatic acid. Mr. Cruikshanks made a very early trial of it in syphilitic cases, and, as is alleged, with the utmost benefit. He also employed the nitric acid, and the oxygenated muriate of potash, and found them eligible remedies. The latter medicine was likewise given by M. Alyon in cases of chancre and secondary ulcers, who found the good effects from it, more expeditious, and more certain, than those of any mercurial preparation. (*Essai sur les Propriétés Médicinales de l'Oxygène, &c.* 8*vo. Paris, an 7me.*) On the other hand, as much contrariety of sentiment respecting the real and permanent efficacy of all these medicines prevails in the numerous reports about them, as in the accounts delivered of the effects of the muriatic and nitric acid; and, therefore, I do not think that the reader, after the copious statements given in this book concerning the *nitric* and *nitrous acids*, (see *these words*) would be pleased to hear again a repetition of very similar contradictions, respecting the oxygenated muriatic acid. I may observe, however, that, if oxygen be the principle, on which the efficacy of many antisyphilitic remedies truly depend, this acid must possess greater virtue than the common muriatic acid. From ʒss. to ʒij. mixed in ℥viij. of water, sweetened with syrup, may be taken in divided doses in the course of the day.

Oxygenated muriatic acid was strongly praised by Guyton de Morveau, as a means of disinfecting sick-rooms, and purifying the air of crowded hospitals.

P.

PANA'RIS. (from ϖαρα, near, and ονυξ, the nail.) See *Whitlow*.

PANNUS. (from ϖονω to labour.) When two or three pterygia, of different sizes occurred on the same eye, with their points directed towards the centre of the cornea, where they met and covered all the surface of this transparent membrane with a dense pellicle, the ancients named the disease, *pannus*. (*Scarpa, Chap.* 14.)

PARACENTE'SIS. (from ϖαρακεντεω, to perforate.) The operation of tapping or making an opening into the abdomen, thorax, or bladder, for the purpose of discharging the fluid confined in these parts in cases of ascites, empyema, hydrothorax, and retention of urine. Effused blood may also require an opening to be made into the chest; and so may confined air in the instance of emphysema.

TAPPING, OR PARACENTESIS ABDOMINIS.

When the swelling extends equally over the whole abdomen, the fluid is usually diffused among all the viscera, and is only circumscribed by the boundaries of the peritonæum. The water is occasionally included in different cysts, which are generally formed in one of the ovaries; and in this case, the tumour which is produced, is not so uniform, the fluctuation is not so distinct as in the former instance, at least this is the case while the disease has not made very great progress. The difference, also, in the consistence of the fluid, may render the fluctuation more or less difficult of detection. When the water is contained in different cysts, it is frequently thick and gelatinous; but when it is uniformly diffused all over the cavity of the peritonæum, it is generally thinner, and even quite limpid. Sometimes a considerable number of hydatids are found floating in the fluid, discharged in cases of ascites.

Whatever may be the efficacy of digitalis, mercury, diuretics, and other evacuants in ascites, they are rarely of any service in cases of local and encysted dropsies. When such swellings continue to enlarge, notwithstanding the adoption of a few measures which will presently be suggested, the sooner the fluid is evacuated the better. It is also well known, that all efforts to produce a radical cure even of dropsies, which are not encysted, too frequently fail. I am decidedly of opinion, however, with Dr. Fothergill, that physicians would meet with much more success in the treatment of ascites, if they were to recommend paracentesis to be done sooner than they generally do. This operation is, for the most part, much too long delayed; and during a long space, the bowels are continually suffering more and more, from the effect of the large quantity of fluid which oppresses them. What ought to render the practice of early tapping more entitled to approbation is, that the operation, when done in the situation which will be presently advised, is perfectly free from danger, attended with very little pain, and need not interrupt the further trial of such medicines as the physician may place confidence in. Paracentesis only becomes a serious measure when the disease has existed for a great length of time, and the patient has been much weakened by it. Indeed there seems much reason to suspect that the operation should be done as soon as the tension of the abdomen, and the fluctuation, leave no doubt concerning the nature of the malady; especially when the first trials which have been made of internal remedies, seem to promise no success. Dr. Fothergill has demonstrated by facts the advantages of this method. On the commencement of an ascites, this celebrated practitioner advises the trial of diuretics and other evacuants. He then adds, that "if by a reasonable perseverance in this course, no considerable benefit accrues; if the viscera do not evidently appear to be obstructed, and unfit for the purposes of life; if the complaints have not been brought on by a long habitual train of intemperance, and from which there seems little hope of reclaiming the patient; if the strength and time of life are not altogether against us; I desist from medicine, except of the cordial kind; and let the disease proceed till the operation becomes safely practicable. When this is done by the moderate use of the warm diuretics, chalybeates, and bitters, also the preparations of squills, in doses below that point at which the stomach would be affected, I endeavour to prevent the abdomen from filling again." (*Med. Obs. and Inq. Vol.* 4, *p.* 112.) The same author remarks, with regard to encysted dropsies, that tapping sometimes effects a radical cure.

The operation should not only be performed in as early a stage of the disease as is compatible with the safety of the parts within the abdomen, it should also be repeated as soon as the quantity of fluid accumulated again is sufficient to make the puncture practicable without danger. Desault used to tap dropsical patients once a week, and in many cases, after he had performed the operation two or three times, the disease was stopped.

The great number of times that the operation has been repeated in some individuals is surprising; for instance, twenty-nine times (*Schmucker, Wahrnehmungen*, 2 *B. p.* 102;) forty-one times (*Med. Communications, Vol.* 2;) fifty-two times (*Schmucker, Vol. cit. p.* 187;) sixty-five times (*Mead*;) one hundred times (*Callisen, Syst. Chir. Hodiernæ, Vol.* 2, *p.* 55;) one hundred and fifty-five times (*Phil. Trans. Vol.* 69;) and if it be possible to credit Bezard, even six hundred and sixty-five times upon one woman in the course of thirteen years. When the patient died, the peritoneum was found to be three lines in thickness. The omentum, mesentery, and even the liver, gall-bladder, spleen, pancreas, kidneys, and bladder, had almost disappeared, a scirrhous mass containing pus occupying their place towards the right side. (See *Bulletin de la Société Médicale d'Emulation, No.* 12, *Dec.*1815.)

Whenever a considerable quantity of fluid is suddenly let out of the abdomen by tapping, the quick removal of the pressure of the water off the large blood-vessels and viscera, may produce swooning, convulsions, and even sudden death. These consequences led the ancients to consider paracentesis as a very dangerous operation, and when they ventured to perform it, they only let out the water gradually, and at intervals.

Dr. Mead, after considering what might occasion the bad symptoms resulting from too sudden an evacuation of a large quantity of fluid from the abdomen, was led to try what effect external pressure would have in preventing such consequences. This practitioner thought that in this way he might keep up the same degree of pressure which the fluid made on the viscera. The success attending some trials of this plan, fully justified the opinion Dr. Mead had conceived; for when the compression is carefully made, the whole of the water contained in the abdomen of a dropsical patient, may be safely discharged as quickly as the surgeon chooses. For this purpose, however, the whole abdomen must be equally compressed, the pressure increased in proportion as the evacuation takes place, and kept up in the same degree for several days afterward. In St. Bartholomew's Hospital, while the water is flowing out, the necessary degree of pressure is usually made with a sheet, which is put round the abdomen. Two assistants, who hold the ends of the sheet, gradually tighten it, in proportion as the fluid is discharged. Immediately after the operation, some folded flannel sprinkled with spirit of wine, is laid over the whole anterior part of the belly, and covered with a broad linen roller, applied with due tightness round the body. Dr. Monro invented a particular kind of belt for the purpose; but though it may be well adapted to the object in view, it is, perhaps, unnecessary, as the above method seems to answer every end.

The instrument used for tapping the abdomen, is called a trocar. (See *Trocar.*)

Of this instrument there are several varieties; but Richter and many other experienced surgeons, give a decided preference to the common trocar. Most of the modern alterations which have been made in the construction of trocars, have only tended, says Richter, to render the employment of these instruments more difficult. There is no reason for the ordinary objection, that the common trocar cannot be introduced without considerable force. If the part into which it is about to be passed, be made tense, very little force will be necessary, especially if care be taken to rotate the instrument gently, as well as push it forward. Hence all the inventions which have originated from this supposed imperfection, are represented by Richter to be entirely useless. He condemns the trocar with a double-edged point, as a bad instrument. The proposal of Mr. Cline to make a puncture with a lancet first, and then to introduce into the opening a blunt-pointed trocar, is alleged to be superfluous. Nay—these innovations are declared to be worse than useless. A cutting instrument is liable to injure blood-vessels, and bring on a weakening degree of hemorrhage; and it is said, that the wound thus made does not heal so readily as that made with a common trocar. That sharp-edged instruments are attended with the inconvenience of being apt to wound enlarged veins, and produce an unpleasant degree of hemorrhage, is a truth of which I have myself met with a convincing example. A female who had a strong aversion to being tapped with a trocar, prevailed upon me to make the opening with a lancet. The puncture was made in the linea alba, about three inches below the navel. A stream of dark-coloured venous blood continued to run from the wound, the whole time the water was flowing out of the cannula, and did not cease until a compress was applied. The quantity of blood lost could not be less than a pint, or a pint and a half. In many cases the loss of so much blood would prove fatal to dropsical patients, and is what one must always feel anxious to avoid.

The most convenient position for the operation, is certainly when the patient is sitting in an arm-chair. However, weakness and other circumstances frequently make it necessary to operate on the patient as he lies in bed.

Until of late, the place in which surgeons used to puncture the abdomen, in cases of ascites, was the centre of a line drawn from the navel to the anterior superior spinous process of the ilium, and on the left side, which was preferred in consequence of the liver not being there. The place for the puncture was usually marked with ink, and was supposed to be always situated just over a part of the linea semilunaris, where there is no fleshy substance, nor any large blood-vessel, exposed to injury. This calculation, however, was made without considering that, in dropsy, the parietes of the abdomen do not yield equally in every situation. On the contrary, it is known, that the front is always more distended than the lateral parts, and that the recti muscles, in particular, are sometimes very much widened. In consequence of these alterations induced by the disease, no dependence can be put on any measurement, made with the view of ascertaining the precise situation of the linea semilunaris. The surgeon who trusts to his being able to introduce the trocar exactly in this place, from any calculation of the above kind, will frequently wound a great thickness of muscle, instead of a part where the abdominal parietes are thinnest. But a still stronger objection is to be urged against the practice of attempting to tap in the linea semilunaris. Men well acquainted with anatomy, have frequently been deceived in their reckoning, and instead of hitting the intended line with their trocars, they have introduced these instruments through the rectus muscle, and wounded the epigastric artery. Patients have died from this error, with large extravasations of blood in the cavity of the peritonæum. In a dropsical person, who has been tapped, it is to be observed also, that an effusion of blood in the abdomen will of course more readily take place, in consequence of the parts not being in the same close, compact state, in which they are in the healthy condition.

Let every prudent practitioner, therefore, henceforth abandon the plan of tapping in the linea semilunaris, and he may the more easily make up his mind to do so, as there is another place where the operation may be done with the utmost facility and safety. The linea alba is now commonly preferred by the best surgeons; because, here no muscular fibres need be wounded, the place can be hit with certainty, and no large blood-vessel can be injured. About the middle point between the navel and pubes, is as good a situation for making the puncture as can possibly be chosen. The surgeon should introduce the trocar in a steady, firm manner, never in an incautious, sudden way, lest parts contained in the peritonæum should be rashly wounded. For the same reason, immediately the point of the trocar has entered the abdomen, a thing always known at once by the sudden cessation of resistance to its passing inward, it should be introduced no further, and its office of making a passage for the cannula is already accomplished. The surgeon, consequently, is now to take hold of the cannula with the thumb and index finger of his left hand, and gently insinuate it further into the cavity of the peritonæum, while with his right hand he is to withdraw the stilette. The fluid now gushes out, and regularly as it escapes, the sheet which is round the patient's body is to be tightened. All the water having been evacuated, a piece of flannel and a roller are to be immediately applied, as above explained, a piece of lint and soap-plaster having been previously applied to the wound.

It is not uncommon for the water suddenly to stop, long before the full quantity is discharged. Sometimes this happens from a piece of intestine, or omentum, obstructing the cannula. This kind of stoppage may be removed by just introducing a probe or director, and holding the portion of bowel back. When the water is very viscid, the only thing we can do is to introduce a large trocar, if doing so should promise to facilitate the evacuation. Also, when hydatids obstruct the cannula, a larger instrument might allow them to escape. In encysted dropsies, the practitioner, of course, can only let the fluid out of those cavities which he can safely puncture.

When a dropsy of the ovary is very large, it also admits of being tapped in the linea alba; but, in this particular case, it is generally best to make the puncture where the swelling is most prominent. In this disease, the ovary is either converted into one large cavity, filled with fluid, or else it contains several distinct cells. The contents are sometimes exceedingly viscid. In the early stages of the case, the tumour is situated towards one side of the abdomen, and seems to ascend out of the pelvis. This kind of progress at once distinguishes the disease from a common ascites, which is attended, from the first, with an equal, gradual, universal swelling of the abdomen. The cyst of the ovary, when it has attained a large size, generally adheres, in different places, to the inner surface of the peritonæum, and, in this state, the whole abdomen often seems uniformly swollen, in consequence of the immense magnitude of the disease. (See *G. D. Motz, de Structurâ, Usu, et Morbis Ovariorum, 4to. Jenæ,* 1788.) The impairment of the health, arising from the pressure of the viscera, and interruption of their functions, and the great difficulty of breathing produced by the pressure on the diaphragm, make it necessary to let out the fluid, and paracentesis must be done in the way already related. The disease is often attended with an almost total stoppage of the secretion of urine. Sometimes the urine is duly secreted, but a retention occurs, so that the use of the catheter becomes indispensable. Tapping, however, can only be regarded as a palliative measure; the water collects again, the same grievances recur, and the operation must be repeated. While an ovarial dropsy is recent, and even after it has been tapped, some attempts may be made to effect a radical cure. Blistering the surface of the abdomen, keeping up a discharge with the savine cerate, and applying a tight roller, have been known to do good. In France, the celebrated Le Dran laid open the cysts of ovarial dropsies. His patients did not die of the consequent inflammation, and the dropsy, indeed, was cured; but there remained either a sarcomatous enlargement of the ovary, which continued to increase till death, or else incurable fistulæ, leading into the cyst, were the consequences. The large size of a wound necessary for this purpose, the danger of inducing inflammation in so extensive a surface as the cyst of a large ovarial dropsy, and the events of Le Dran's cases, are circumstances, on the whole, which ought to keep the practice from ever being revived.

A still more absurd plan has been attempted, viz. to cure the disease by injections, like hydroceles. I formerly saw two cases in which port wine and water were injected, by the late Mr. Ramsden of St. Bartholomew's Hospital; one patient died very soon afterward of the inflammation, and the other perished more lingeringly from the same cause. Setons have been tried without success.

Sometimes, though very seldom, the operation of paracentesis is necessary for giving vent to collections of air in the abdomen. Air, when confined in this manner, is generally contained in the bowels, which it inflates to an enormous size. Instances, however, are related of quantities of air being confined between the peritonæum and intestines: but, in some of these cases, it is said that the air was known to have escaped through a small hole in some part of the intestinal canal, and it is probable, that all the other examples were of the same kind. This disease is named *tympanites*, and may render making an opening into the abdomen necessary. Notwithstanding authors generally recommend a small trocar for the purpose, there can be no doubt that dividing the skin, and making a cautious puncture with a lancet through the linea alba and peritonæum, would be a preferable mode of proceeding. The abdomen must also be compressed with a sheet while the air is escaping, and afterward with a roller, just as if the case were an ascites. Even when the air is contained in the bowels, if it should be enormous in quantity, occasion urgent symptoms, and cannot be got rid of in other ways, authors recommend paracentesis.

PARACENTESIS OF THE THORAX.

The necessity for this operation is indicated when the heart or lungs are oppressed by any kind of fluid confined in the cavity of the chest. Every body knows that the free and uninterrupted performance of the functions of these organs is essential to the support of life. When the action of these viscera is disturbed by the lodgment of a collection of any kind of fluid in the thorax, no internal medicines can be much depended upon for procuring relief. The only means from which benefit can be rationally expected, is letting out the fluid by making an opening in the parietes of the chest.

The nature of the effused fluid can make no difference in regard to the propriety of discharging it in this manner; and, though some authors have only treated of this operation as applicable to cases of hydrops pectoris and empyema, it may also be of the greatest service when air is confined in the chest, (see *Emphysema*) or blood extravasated there, (see *Wounds of the Thorax*) so as to make dangerous pressure on the lungs and diaphragm.

In this place I shall content myself with describing the best method of performing paracentesis thoracis, referring the reader to the articles just mentioned for information concerning the particular symptoms and circumstances which may render the operation proper, and the rest of the surgical treatment peculiar to each affection.

The safest and most convenient situation for making an opening into the chest, is between the sixth and seventh true ribs, on either side, as circumstances may render necessary. The surgeon should only recollect, that the two cavities of the pleura are completely distinct from each other, and have no communication whatsoever, so that, if fluid were contained on the left side of the thorax, making an opening into the right cavity would not serve for discharging the accumulated matter. The practitioner should also remember, that, when there is a fluid on both sides of the chest, paracentesis must never be done for the relief of the two collections at the same time; because there is great reason to believe that, as the lungs on one side usually collapse, when there is a free communication between the air and inside of the thorax, they would do so on both sides, were an opening made at the same time into each bag of the pleura. It is hardly necessary to remark, that, in this condition, the patient could not breathe, and would die suffocated. The operation consists in making an incision, about two inches long, through the integuments which cover the space between the sixth and seventh true ribs, just where the indigitations of the serratus major anticus muscle meet those of the externus obliquus. Here it is unnecessary to divide any muscular fibres, except those of the intercostal muscles, and, by putting the patient in a proper posture, the opening that is to be made will be depending enough for any purpose whatsoever. The surgeon, avoiding the lower edge of the upper rib, where the intercostal artery lies, is then cautiously to divide the layers of the intercostal muscles, till he brings the pleura into view; when this membrane is to be very carefully divided with a lancet. The instrument should never be introduced in the least deeply, lest the lungs should be injured. The size of the opening in the pleura should never be larger than necessary. The discharge of blood and matter will of course require a freer aperture than that of air or water. If requisite, a cannula may be introduced into the wound for the purpose of facilitating the evacuation of the fluid, and it may even in some cases be proper to let this instrument remain in the part, in order to let the water or pus escape, as often as another accumulation takes place. It is obvious, however, that a cannula for this object should only be just long enough to enter the cavity of the pleura, and should have a broad rim to keep it from slipping into the chest. A piece of sticking-plaster would easily fix the cannula, which might be stopped up with a cork, or any other convenient thing, or left open, according as the circumstances of the case, and the judgment of the surgeon should direct.

Paracentesis of the abdomen, and that of the thorax, are described in all treatises on the operations and systems of surgery. The works of Sharp, Le Dran, Bertrandi, Callisen, Richter, Sabatier, Larrey, and Boyer, are particularly deserving attention. A case, in which eleven pints of a fluid, resembling whey, were discharged from the chest by paracentesis, and the patient recovered, is detailed by Dr. Archer in the Trans. of the King's and Queen's Colleges of Physicians in Ireland, Vol. 1, art. 1. See also *N. Friedreich, Vorzuge des Bauchstiches in der Bauchwassersucht*, 12*mo. Wurzb.* 1816, 1817.

For an account of the paracentesis of the bladder, refer to *Bladder, Puncture of.* Consult also *Emphysema, Empyema,* and *Wounds of the Thorax.*

PARAPHYMO'SIS, or PARAPHIMOSIS. (from παρα, back, and φιμοω, to bridle.) This signifies the case in which the prepuce is drawn quite behind the glans penis, and cannot be brought forward again. See *Phymosis*, with which it will be considered.

PARONY'CHIA. (from παρα, near, and ονυξ, the nail.) An abscess at the end of the finger, near the nail. See *Whitlow.*

PAROTID DUCT. Every one acquainted with anatomy is aware, that behind the jaw, on each side, there is situated a large conglomerate gland, being the principal one of such as are destined to secrete the saliva, with which the cavity of the mouth, and the food which we swallow, are continually moistened. The parotid duct crosses the cheek, being situated about one-third from the zygoma, and two-thirds from the basis of the jaw. After passing over the masseter muscle, it pierces the buccinator, and terminates in the mouth by a considerable orifice opposite the space, between the second and third bicuspid grinders of the upper jaw. As soon as it has passed the masseter, it dives deeply into the fat of the cheek, and, as M. Louis observes, makes an angle before it opens into the mouth. (*Mém. de l'Acad. de Chir. T.* 3, *p.* 457.)

From the situation of the parotid duct it is liable to be wounded, and this has even been done by the surgeon's lancet, through ignorance. (See *Monro's Works, p.* 520.) In cases of this kind, the continual escape of saliva may prevent the wound from healing, and, what is called a *salivary fistula* would be the perpetual consequence, if no steps were taken to afford relief. The parotid duct has sometimes been ruptured by blows. (*Œuvres Chir. de Desault, T.* 2, *p.* 221.) Cases also occur, in which the face becomes considerably swollen, in consequence of the saliva insinuating itself into the cellular substance, just as the air does in emphysema. Respecting the last circumstance, I shall only just mention, that mischief of this kind must always be prevented from becoming very extensive, by making a depending opening for the ready escape of the fluid.

With regard to the treatment of salivary fistulæ, if the division of the parotid duct is recent, the sides of the wound should be brought into contact, and a steady pressure maintained on that part of the cheek, by means of suitable compresses and a roller. In this manner, a salivary fistula may often be prevented altogether: either the divided ends of the duct reunite, and the spittle resumes its original course into the mouth; or, what is more probable, the wound in the face heals at every part, with the exception of a small fistulous track, which serves as a continuation of the duct into the inside of the mouth. The latter kind of cure, however, can only take place when the wound extends quite through the cheek; but the chance of the two portions of the duct uniting, and becoming continuous again, should always be taken in recent cases.

When a salivary fistula is actually formed, a seton, introduced from the external fistulous orifice into the mouth, is a method which seems to have, with justice, the greatest share of approbation. The celebrated Monro adopted this plan with success; he kept in the seton till the channel, which it had formed, had become fistulous, after which it was withdrawn, the external orifice being touched with the argentum nitratum, healed up, and the saliva in future flowed through the artificial fistulous channel into the mouth.

Desault used to practise the seton as follows:—He introduced two fingers of his left hand into the patient's mouth, and placing them between the teeth and the cheek, opposite the fistula, thus kept the integuments tense, and the gums from being injured. He then introduced a small hydrocele trocar, with its cannula, just before the opening of the posterior part of the duct, and pushed it through the cheek, in a direction a little inclined forward. An assistant now took hold of the cannula, while Desault withdrew the perforator, and passed through the tube a bit of thread into the cavity of the mouth. The cannula was next taken out, and a seton, which was then fastened to the end of the thread in the mouth, was drawn from within outward; but not so far as to come between the edges of the external opening, where the thread alone lodged, and this was fastened with sticking-plaster to the outside of the cheek. The outer wound was dressed with lint and compresses. Desault used to change the seton daily, introducing regularly rather a larger one, and taking especial care not to bring it between the edges of the wound, which was afterward covered with sticking plaster. He enjoined the patient not to move the jaw much, and only allowed him, for some time, liquid food. In about six weeks he used to omit the seton, leaving in the thread, however, for a little while longer. This being taken way, he used to finish the cure by touching the little aperture remaining, with caustic.

The making of an artificial passage is one of the most ancient plans of curing salivary fistulæ. Every author has had his particular method of doing it, and numerous variations are to be met with, either in the instrument employed for piercing the cheek, or in the substance intended for maintaining the opening. For the first step of the operation, surgeons sometimes used the actual cautery, as Saviard furnishes us an instance of; sometimes an awl, as Monro did; sometimes a common knife, or lancet; sometimes a straight needle, which drew in the thread after it; but Desault's trocar generally merits the preference, because the cannula, by remaining in the wound after the perforator is withdrawn, allows the thread to be introduced, which in every other way is either difficult to accomplish, or requires the use of several instruments.

For the second step of the operation, viz. keeping the opening distended, cannulæ were employed by Duphenix, who used to make a suture over them; a plan objectionable, inasmuch as it was attended with the inconvenience of a solid body left in the parts, and also that of the instrument being apt to slip into the mouth. The seton, therefore, ought to be preferred, and there can be no doubt that Desault's method is better than the one followed by Monro. (See on this subject, *Monro's Works; Œuvres Chir. de Desault, par Bichat, T.* 2, *p.* 221. Also *Mém. de l'Acad. de Chir. T.* 3. *J. B. Siebold, Diss. sistens Historiam Systematis Salivalis physiologice et pathologice considerati, fol. Jenæ,* 1797.)

PAROTID GLAND, EXTIRPATION OF. (See *Tumours.*)

PARU'LIS. (from ϖαρα, near, and ȣλον, the gum.) An inflammation, boil, or abscess in the gums.

PENIS, AMPUTATION OF. No part of the penis should ever be amputated, on account of a mortification, because the dead portion will be naturally thrown off, and the ulcer heal without the least occasion for putting the patient to any pain from the employment of the knife. Some cancerous and fungous diseases, are the cases in which it is often really proper and necessary to amputate more or less of this organ.

However, before a surgeon ventures to do the operation, he ought to be certain that it is the substance of the penis which is incurably diseased; for, as that judicious surgeon Callisen remarks, tumours, excrescences, ulcers, and gangrenous mischief, of the prepuce, sometimes present appearances which may lead an inexperienced practitioner to fancy the whole thickness of the part affected with irremediable disorder, while the glans is actually in a sound state. Hence, whenever the least doubt exists, it is better to remove first the prepuce and skin, in order that the true condition of the glans may be detected. (*Callisen, Systema Chirurgiæ Hodiernæ, pars posterior, p.* 420, *Hafniæ*, 1800.)

The old surgeons, fearful of hemorrhage, used sometimes to extirpate a part of the penis, by tying ligatures round it with sufficient tightness to make it mortify, and slough off. Thus Ruysch once performed the operation. (See *Obsv.* 30.) The plan, however, is exceedingly painful, and notwithstanding the authority of Heister, has been most properly rejected from modern surgery.

The amputation may be done in the following manner:—A circular incision is to be made through the skin, about a fingerbreadth from the cancerous part. As Callisen observes, it is hardly ever requisite to draw the skin back before it is cut; because after the corpora cavernosa are divided, they retract so considerably, that there is always a sufficiency of the integuments. (*Syst. Chir. Hodiernæ, pars posterior, p.* 421.) As soon, therefore, as the circular incision through the skin has been made, the corpora cavernosa and urethra are to be cut through, by one stroke of the knife, on a level with the cut edges of the integuments. Sabatier even advises us to draw the skin towards the glans penis, before we employ the knife, so convinced is he of the inutility of saving any of it, and of the inconveniences which may result from its lying over and obstructing the orifice of the urethra. His mode of operating is also particularly simple, as he cuts through the integuments and penis together by one stroke of the knife, without making any preliminary circular division of the skin. (*Médecine Opératoire, T.* 3, *p.* 305, *Edit.* 2.)

The bleeding arteries are now to be immediately tied: the chief are, one on the dorsum of the penis, and one in each corpus cavernosum. When a general oozing from the wound still continues, some recommend (*White, Hey, &c.*) applying sponge to its surface; others (*Latta*) finely scraped agaric, with a small proportion of pounded white sugar, or gum arabic. Perhaps, however, finely scraped lint, supported with compresses, would be quite as effectual as any styptics, and certainly the latter applications should be avoided, if possible, because stimulating, and productive of pain and inflammation. A surer and preferable method of stopping the oozing of blood, and at the same time of healing the wound, might be to bring the skin forward over the end of the stump, with two strips of sticking plaster, after introducing a flexible gum catheter into the continuation of the urethra, so as to keep its orifice unobstructed, and the urine from coming into contact with the wound. There can be little doubt that the gum catheter would be better than a silver one, or any metallic cannula, commonly advised for the above purposes, because it lies in the passage with less irritation. It is but justice to Callisen to state, that he seems to be one of the few good surgical writers, who have particularly recommended in these cases the elastic gum catheter, in preference to that made of silver. (*Op. cit. p.* 421.) In one case, in which Mr. Hey operated, he made a longitudinal division of the integuments, at the inferior part of the penis, so as to make them cover its extremity without puckering, or lying over the orifice of the urethra. The corpora cavernosa, however, do not readily granulate, and unite to the skin by the first intention. (*Hey, p.* 452.) After the first dressings are removed, the part should be dressed with the unguentum spermatis ceti, or any mild unirritating salve.

In consequence of the introduction of a cannula being neglected, Le Dran mentions his having seen the orifice of the urethra become closed a few hours after the operation, so that the patient could not make water. The orifice of the passage could not be discovered without great difficulty. A lancet being introduced at the point, against which the urine seemed to be forced, a quantity of it gushed out, and as a cannula was not at hand, a sound was introduced till one could be procured. (*Traité des Oper. de Chirurgie.*)

Pearson, in his *Practical Observations on Cancerous Complaints*, has treated of this operation: he particularly advises the skin not to be drawn back, because, when saved in this manner, it impedes the free exit of the urine. He likewise disapproves of introducing cannulæ, as creative of pain, and spasms of the urethra, and unnecessary, since the stream of urine will always preserve the urethra in a permeable state. (*P.* 103.)

When the penis is amputated near the pubes, the remainder shrinks under that bone and within the integuments so far, that it is difficult to tie the arteries. In order to obviate this inconvenience, Schreger recommends the skin to be drawn forwards, and fixed with a band; then to make an incision only deep enough to divide the dorsal arteries, which are to be tied, before the knife is used again. The incision is then to be continued perpendicularly till the two arteries of the corpora cavernosa are cut. These are now to be tied. Then the corpus spongiosum and its two arteries are to be cut through, which last are to be secured. Lastly, the rest of the skin of the penis is to be divided. In this way Schreger amputated a diseased penis, of which only a part, about an inch in length, was sound.

(*Sharp, Le Dran, Bertrandi, and Sabatier's books on the operations, may be consulted.* Also, *l'Encyclopédie Méthodique; Partie Chir. Art. Verge. Hey's Practical Observations in Surgery*, p. 445. *Pearson on Cancerous Complaints*, p. 103, *&c. Warner's Cases in Surgery*, p. 278, *Edit.* 4. *E. C. Biener, De Extirpatione Penis per Ligaturam, 4to. Lips.* 1816. *J. H. Thaut, Diss. de Virgæ Virilis Statu sano et morb. ejusdem imprimis amputatione. B. G. Schreger's Chir. Versuche; Neue Methode den Penis zu Amputiren, B.* 1, *p.* 242, 8vo. *Nurnberg*, 1801.)

PENIS, CANCER OF. A wart, or a tubercle, on the prepuce, the frænum, or the glans penis, is generally the first symptom, and it often remains in a quiet state for many years. When irritated, however, it becomes painful, and enlarges, sometimes enormously in a very short time. At the same time ulceration, and a discharge of sanious fetid matter, take place. The disease sometimes also occasions in the urethra fistulous openings, out of which the urine escapes, and the lymphatic glands in the groin may become affected as the disease advances. Mr. Pearson says, that "cancerous excrescences have a broad base, often more extensive than their superficies; they seem to germinate deeply from within, or rather to be a continuation of the substance of the part; and, in their progressive state, the contiguous surface has a morbid appearance." What Mr. P. considers as a venereal wart, has a basis smaller than its surface; its roots have rather a superficial attachment, and the contiguous parts have a natural appearance (*p.* 97.) Such are this gentleman's marks of discrimination. We might question, however, whether Mr. Pearson, notwithstanding his great opportunities, ever saw a really *venereal* wart. For many years past I have never seen any excrescences of this kind in St. Bartholomew's hospital, which truly required mercury for their cure, or which, when cured without it, were followed by any inconvenience. If my memory does not fail me, Mr. Abernethy also disbelieves in the doctrine of venereal warts.

Foul, spreading, sloughy ulcers of the penis, should be discriminated from cancer. It is worthy of attention that almost all the cases of cancer of the penis recorded by Mr. Hey were attended with a congenital phymosis. The same complication also existed in another example, in which Boyer performed amputation of the penis in la Charité, on account of a cancerous affection of the part. In the only two opportunities of doing this operation, which M. Roux has had, the cases were likewise accompanied with a natural phymosis. Hence, this author considers such a state of the prepuce as particularly conducive to cancer of the penis, and earnestly enjoins surgeons to recommend their patients to have the first inconvenience rectified, so that no risk of the other more serious affection may be encountered. (See *Parallèle de la Chirurgie Angloise, &c. p.* 306, 307.) In two out of three cases which were reported to be cancerous, and for which amputation was done under my notice, it did not appear that any degree of phymosis existed. (See *Pearson on Cancerous Complaints. Hey's Practical Observations in Surgery. Roux, Voyage fait en Angleterre en* 1814, *ou Parallèle de la Chir. Angloise, &c. p.* 306.)

PERINÆ'UM, FISTULÆ OF. (See *Fistulæ in Perinæo.*)

PE'RNIO. (from πυρνα, or πτερνα, the heel.) A chilblain, especially on the heel. (See *Chilblain.*)

*PESSARY. (from πεσσω, to soften.) The intention of pessaries among the old practitioners, was to keep medicinal substances applied within the pudenda. They are now never made use of, except for preventing a prolapsus of the uterus or vagina, or for keeping up a very uncommon kind of rupture, explained in the article *Hernia.*

PHAGEDÆ'NA. (from φαγω, to eat.) An ulcer which spreads, and as it were eats away the flesh. Hence the epithet, *phagedenic*, so common among surgeons. For an account of the *phagedæna, gangrænosa*, see *Hospital Gangrene.*

PHARYNGOTOMY. (from φαρυγξ, the pharynx, and τεμνω, to cut.) See *Œsophagotomy.*

PHARYNGO'TOMUS. (from φαρυγξ, the throat, and τομη, an incision.) An instrument for scarifying the tonsils, and for opening abscesses about the fauces. It was invented by Petit, and is nothing more than a sort of lancet which is enclosed in a sheath. By means of a spring the point is capable of darting out to a determinate extent, so as to make the necessary wound, without risk of injuring other parts.

PHLEBO'TOMY. (from φγεψ, a vein, and τεμνω, to cut.) The operation of opening a vein, for the purpose of taking away blood. See *Bleeding.*

PHLE'GMON. (from φλεγω, to burn.) Healthy inflammation. (See *Inflammation.*)

PHLOGO'SIS. (from φλογοω, to inflame.) An inflammation. A flushing.

PHRENI'TIS. (from φρενες, the diaphragm, supposed by the ancients to be the seat of the mind.) An inflammation of the brain. Phrensy.

Inflammation of the brain is a frequent consequence of injuries of the head. The symptoms are an increased and disordered state of the sensibility of the whole nervous system; the retina cannot bear the usual stimulus of light; the pupils are contracted; the pulse is frequent and small; the eyes are red and turgid, and the iris sometimes actually inflamed, (*Wardrop, Essays on the Morbid Anat. of the Eye, Vol.* 2,) the countenance is flushed, and the patient is restless, mutters incoherently, and grows wild and delirious.

Phrenitis is treated on the antiphlogistic plan. Copious bleedings and other evacuations, are highly proper. Some of the blood should be taken from the temporal arteries. The skin ought to be kept moist with antimonials, and a counter-irritation should be excited on the scalp by blisters.

PHY'MA. (from φυω, to grow.) Tubercles comprehend eight genera, and we learn from Dr. Bateman, that, under the genus *phyma*, the late Dr. Willan intended to comprise the terminthus, the epinyctis, the furunculus, and the carbuncle. (See *Bateman's Synopsis of Cutaneous Diseases*, *p.* 270, *Edit.* 3.) According to Pott, this term was formerly applied to an inflammation near the anus. See *Anus*, *Abscesses of.*

PHYMO'SIS, or rather PHIMOSIS. (from φιμος, a muzzle.) A case in which the prepuce cannot be drawn back, so as to uncover the glans penis. It is of two kinds, viz. *accidental*, and *natural* or *congenital*. Both the accidental phymosis, and paraphymosis, according to Mr. Hunter, arise from a thickening of the cellular membrane of the prepuce, in consequence of an irritation capable of producing considerable and diffused inflammation. A chancre is a frequent cause; but a mere inflammation and discharge from the glans and prepuce, and also a gonorrhœa, may bring on these affections. The inflammation often runs high, and is frequently of the erysipelatous kind. The cellular membrane being loose, the tumefaction becomes considerable, and the end of the prepuce being a depending part, the serum often lodges in it, and makes it œdematous. A congenital contraction of the aperture of the prepuce is very common, and persons so affected have a natural and constant phymosis. Such a state of parts (says Mr. Hunter) is often attended with chancres, and it produces very great inconveniences during the treatment. When there is considerable diffused inflammation, a diseased phymosis similar to the natural one, unavoidably follows; and whether diseased or natural, it may produce a paraphymosis, simply by the prepuce being brought back upon the penis. This tight part, then acting as a ligature round the body of the penis, behind the glans, retards the circulation beyond the constriction, so as to produce an œdematous inflammation on the inverted part of the prepuce.

When the prepuce is very long, phymosis may also arise from the swelling of the glans penis, produced by sores on the latter part, or the irritation of a severe gonorrhœa. (*Travers in Surgical Essays, Part* 1, *p.* 132.) My own observations lead me to consider an irritation and swelling of the prepuce itself as by far the most common causes of the accidental phymosis.

In some children, the *natural* or *congenital* phymosis is so considerable, that the urine cannot pass with ease; but the aperture of the prepuce generally becomes larger as they grow older, and the bad consequences which the phymosis might have occasioned in disease, are thus avoided.

In certain individuals, especially old men, the prepuce sometimes contracts without any visible cause whatever, and becomes so narrow as to hinder the water from getting out, even after it has got free of the urethra, and consequently, the whole cavity of the prepuce becomes filled with urine, attended with great pain.

In phymosis, when the prepuce swells and thickens, more and more of the skin of the penis is drawn forwards over the glans, and the latter part becomes at the same time pushed backward by the swelling against its end. From such a cause Mr. Hunter has seen the prepuce projecting more than three inches beyond the glans, with its aperture much diminished.

Mr. Hunter also notices, that the prepuce often becomes, in some degree, inverted, by the inner skin yielding more than the outer, and the part seems to have a kind of neck where the outer skin naturally terminates. From the tightness and distention of the parts, the prepuce now cannot be drawn more back, so as to expose any sores, which may be situated under it. This state is frequently productive of bad consequences, especially when there are chancres behind the glans; for, the glans being between the orifice of the prepuce and the sores, the matter sometimes cannot get a passage forward, between the glans and prepuce, and, consequently, it accumulates behind the corona glandis, so as to form a kind of abscess, which produces ulceration on the inside of the prepuce. This abscess bursts externally, and the glans, often protruding through the opening, the whole prepuce becomes thrown towards the opposite side, and the penis seems to have two terminations. On the other hand, (says Mr. Hunter) if the prepuce is loose and wide, and is either accustomed to be kept back in its sound state, or is pulled back to admit of the chancres being dressed, and is allowed to remain in this situation, till the above tumefaction takes place, the case is then named a *paraphymosis*. Also, when the prepuce is pulled forcibly back, after it is swelled, it is then brought from the state of a phymosis to that of a paraphymosis. The latter case is often attended with worse symptoms than the former, especially when it has first been a phymosis. According to Mr. Hunter, the reason of this is, that the aperture of the prepuce is naturally less elastic than any other part of it; therefore, when the prepuce is pulled back upon the body of the penis, that part grasps it more tightly than any other portion of the skin of the penis, and more so, according to the inflammation. Hence, there are two swellings of the prepuce, one close to the glands; the other behind the stricture. The constriction is often so great as to interrupt the circulation beyond it. This increases the swelling, adds to the stricture, and often produces a mortification of the prepuce itself, by which means the whole diseased part, together with the stricture, is sometimes removed, forming, as Hunter ably expresses himself, a natural cure. In many cases, the skin and prepuce are not the only parts affected; adhesions, and even mortification may also take place in the glans, corpora cavernosa, &c. (See *Hunter on the Venereal*, 221, *&c.*)

An accidental phymosis should always be prevented if possible, and therefore, says Mr. Hunter, upon the least signs of a thickening of the prepuce, which is known by its being retracted with difficulty and pain, the patient should be kept quiet; if in bed, so much the better, as in a horizontal position, the end of the penis will not be so depending. If confinement in bed cannot be complied with, the end of the penis should be kept up, though this can hardly be done when the patient is walking about. The object of this plan is to keep the extravated fluids from gravitating to the prepuce, which they would hinder from being drawn back again even more than the inflammation itself.

When phymosis is recent, and attended with swelling of the glans or prepuce from inflammation, Mr. Travers recommends injections of tepid water, or milk and water, beneath the foreskin; and the immersion of the penis three or four times a day, in a tepid bath, keeping the end of the penis upwards; and the use of leeches; which I think with him and other writers, (see *Dict. des Sciences Med. T.* 41, *p.* 334,) should never be put exactly on the swelled prepuce itself. As the inflammation subsides, injections of weak goulard, or the solution of alum, or liquor calcis and calomel, may be substituted. (*Travers, Surgical Essays, Part* 1, *p.* 138.) Instead of warm applications, some practitioners prefer cold; and it is yet an unsettled question which remedies answer best.

When the inflammation is of longer standing, the swelling compresses the urethra, and there is tendency to abscess, ulceration of the latter passage, extravasation of urine, and gangrene of the skin, Mr. Travers advises the employment of emollient poultices and fomentations (the common practice, I believe,) and the introduction of a small elastic gum-catheter into the bladder. "This (says he) is not a practice indicated by the degree of stricture, which is seldom considerable enough to require it: but, by the approaching danger of extravasation. *It should not, therefore, be taken up, unless the cellular membrane of the penis has advanced to suppuration.*"

As when there are sores, they cannot be dressed in the common way, injections must frequently be thrown under the prepuce, or the operation for phymosis performed. Mr. Hunter advises mercurial injections; either crude mercury, rubbed down with a thick solution of gum-arabic; or calomel with the same, and a proportion of opium; or else a solution of one grain of the oxymuriate of mercury in one ounce of water. Mr. Hunter also recommends the application of emollient poultices, with laudanum in them, and to let the part, previously to the application being made, hang over the steam of hot water, with a little vinegar and spirit of wine in it.

When, in a case of phymosis, chancres bleed, Mr. Hunter recommends the oil of turpentine as the best stimulus for making the vessels contract; but, when the hemorrhage proceeds from irritation, he recommends sedatives. Whatever is used, he says, must be injected under the prepuce. Under such circumstances, it has always been a rule with me to avoid irritating applications, and on this account I have never used turpentine, particularly as any troublesome bleeding from chancres may always be effectually checked by covering the penis with linen kept well wet with very cold water. When the inflammation has abated, Mr. Hunter advises moving the prepuce occasionally, to prevent its becoming adherent to the glans. He says, he has seen the opening of the prepuce so much contracted, from the internal ulcers healing and uniting, that there was hardly any passage for the water. If the passage in the prepuce, so contracted, be in a direct line with the orifice of the urethra, a bougie must be used. If otherwise, the operation of slitting up, or removing part of the prepuce, becomes necessary.

When matter is confined under the prepuce, in the manner above described, Mr. Hunter recommends laying the prepuce open, from the external orifice to the bottom, where the matter lies, as in a sinus or fistula. However, Mr. Hunter thinks laying open the prepuce for the mere purpose of applying dressings unnecessary, as the sores may be washed with injections, by means of a syringe.

I happened to serve my apprenticeship at St. Bartholomew's, at a time when the fashion of cutting every phymosis, inflamed or not, was far too common, and I had abundant opportunities of witnessing the irreparable gangrenous mischief frequently thus produced. It gives me pleasure, therefore, to find this villanous practice justly disapproved of by a modern writer. "It is not adviseable, (says Mr. Travers,) to cut the inflamed prepuce, nor, indeed, any inflamed part. I lately saw a phymosis induced by a thickened and rigid state of the membrane of the prepuce, during the free use of mercury, constitutionally and locally, for the cure of two sores, each of the size of a split pea, situated one on each side of the anterior fold of the prepuce. It was the opinion of an eminent surgeon, that those sores, which were thoroughly intractable, would not heal unless the prepuce was freely divided; and, impressed with the same idea, after poulticing for some days, I slit it up. The sores immediately healed; but the wound as quickly assumed the same indolent and intractable character which had belonged to the sores, and was so slow in healing, that it seemed to be only a transfer of the disease from one part to another." (P. 139.) I have not only witnessed the same fact, in several cases under the late Mr. Ramsden, and in St. Bartholomew's Hospital, but have seen mortification brought on by the still more rash practice of cutting the prepuce either when the part was in a state of acute inflammation, or there were ulcers within it, when the constitution was in a reduced and very disordered state from the injudicious and immoderate use of mercury.

The common operation, for the cure of phymosis, consists in slitting open the prepuce, nearly its whole length, in the direction of the penis. This plan is certainly the most eligible, when the matter of a chancre cannot escape from under the prepuce; because circumcision, which many surgeons, since Mr. Hunter's time, have preferred, would not suffice for giving vent to the accumulated pus. In many cases of phymosis, says Mr. Hunter, an operation is improper; for, while the inflammation is very considerable, such a measure might bring on mortification. He acknowledges, however, that there are cases, in which a freedom given to the parts would prevent the latter event. When matter is confined under the prepuce, an opening is indispensable, and, if the patient should object to the common operation, an opening should be made with a lancet directly through the prepuce, or else with a caustic. (See *Hunter on the Venereal Disease, p.* 232, *et seq.*)

When the prepuce is to be slit open, a director is first to be introduced under it, and the division is then to be made with a curved pointed bistoury, from within upward.

Many surgeons object to this operation, because the prepuce continues afterward in a very deformed state; and they perform circumcision, or amputation of the prepuce, in the following manner. The prepuce is first taken hold of with a pair of forceps, as much of the part being left out, as is judged necessary to be removed. The removal is then accomplished by one sweep of the knife, which directed by the blades of the forceps, is sure of making the incision in a straight and regular manner. A fine suture is next passed through the edges of the inner and outer portions of the skin of the prepuce so as to keep them together. The only necessary dressings are lint, and over it an emollient poultice.

At the period when I first entered the profession, it was the custom to salivate every patient who happened to have a phymosis. However, now that the fact of any irritation about the prepuce and glans penis, even that of common warts, being capable of producing the complaint is well known, such absurd practice has been relinquished, and the cause and condition of the disease are always considered previously to the determination for any particular method of treatment. Nay, even when phymosis does arise from chancres, if there be a great deal of inflammation, the use of mercury may rather do harm than good, and the practitioner should not be precipitate in its administration. On this point, I fully coincide with Mr. Travers:—"Upon many occasions (says he) practitioners are too anxious to contend with the scientific character of the venereal disease, to the neglect of the inflammatory state of the affected parts exhibited during its height. The abuse of administering mercury for an acute gonorrhœa, and recent sores, accompanied by phymosis, or an approach to that state, is of common occurrence, and it is far from being recognized by the profession, as an established rule of practice, that its constitutional administration is inadmissible during the existence of active inflammation, in cellular textures." (*Surgical Essays, Part* 1, *p.* 131.)

In nine cases out of twelve, in which the experienced Mr. Hey had occasion to amputate the penis for cancerous disease, the patients were also affected with a natural phymosis. (*Pract. Obs. in Surgery.*) Roux has noticed the same thing in three similar examples, and, therefore, as he conceives that phymosis may be conducive to carcinoma of the penis, he thinks that it should always be remedied in time. (*Parallèle de la Chir. Angloise, p.* 306.)

TREATMENT OF PARAPHYMOSIS.

The removal of the stricture in this case should always be effected, because its continuation is apt to produce a mortification in the parts, between the stricture and the glans. It may be done in two ways; either by compressing with the fingers all the blood out of the swelled glans so as to render this part sufficiently small to allow the constricting prepuce to be brought forward over it, with the aid of the two fingers; or by dividing the stricture with a knife. In the last edition of this work, as Mr. Dunn of Scarborough has reminded me, the power of cold applications, in promoting the reduction of the glans, should have been mentioned. This method should always be put in practice, before the reduction by compression is attempted, as a preliminary measure, which sometimes succeeds of itself, and renders unnecessary any painful handling of the parts. From the great success, which I have seen attend the first mode, I should not conceive the second one so frequently necessary, as Mr. Hunter seems to lay down. This operation is always troublesome to accomplish, because the swelling, on each side of the stricture, covers or closes the tight part, which cannot be got at without difficulty. Mr. Hunter says, the best way is to separate the two swellings, as much as possible, where you mean to cut, so as to expose the constricted part; then take a crooked-pointed bistoury, pass it under the constriction, and divide it. None of the swollen skin, on each side, should be cut. The prepuce may now be brought forward, unless it be thought more convenient, for the purpose of dressing the chancres, to let it remain in its present situation. (See *Hunter on the Venereal Disease, p.* 238, 239.)

The original disease producing phymosis and paraphymosis, must always be attended to, and the employment of mercury must be necessary or unncessary, according to the nature of the affection, of which these are only effects.

One of the most interesting writers on Phymosis and Paraphymosis is J. L. Petit, Traité des Mal. Chir. T. 2; many of whose valuable observations are contained in the 2d vol. of the First Lines of Surgery, 8vo. 1820. *Consult also J. Hunter on the Venereal Disease. Sabatier, Médecine Opératoire, T.* 3, 8vo. *Paris,* 1810. *Travers, in Surgical Essays, Part* 1, 8vo. *Lond.* 1818. *There is also a valuable chapter on this subject in Richter's Anfangsgr. der Wundarzn. B.* 6.

PILES. (See *Hemorrhoids.*)

PILULÆ AMMONIARETI CUPRI.— ℞. Cupri Ammoniareti gr. xvj. Micæ Panis ℈iv. Liquoris Ammon. q. s. M. fiant pilulæ xxxii. (*Edinb. Disp.*) This is said to be the best form of exhibiting copper internally, which mineral some think worthy of trial in cases of gleets.

PILULÆ ARGENTI NITRATIS. ℞. Argenti Nitratis gr. iij. Aquæ Distillatæ gutt. aliquot. Micæ Panis q. s. ut fiant pil. xx. The author of the *Pharmacopœia Chirurgica* suggests the trial of these pills in obstinate leprous, and other cutaneous affections, and phagedenic, anomalous ulcers, connected with constitutional causes. Two or three may be given twice a day. Dr. Powell gave the argentum nitratum internally, in a case of hydrophobia, but without any sensible effect.

PILULÆ COLOCYNTHIDIS CUM HYDR. SUBM. ℞. Extracti Colocynth. comp. ℈ij. Hydr. Submur. gr. xii. Saponis ℈j. Misce. ut fiant pilulæ duodecim. Two of these pills operate as a purgative, and they are often prescribed in various surgical cases.

PILULÆ CONII. ℞. Extracti Conii ʒss. Pulv. Herb. Cicutæ q. s. fiant pil. lx. These are the hemlock pills in use at Guy's Hospital. Cicuta is occasionally given in scrofulous, cancerous, and venereal cases. The surgeon should begin with small doses, and increase them gradually, till nausea and headach arise. From one to a greater number of these pills may be given, in this manner, every day.

PILULÆ CUPRI SULPHATIS. ℞. Cupri Sulphatis gr. xv. Olibani Extracti Cinchonæ, sing. ʒij. Syrup. simpl. q. s. fiant pil. lx. From one to four of these pills may be given in a day, for gleets. (*Pharm. Chirurg.*)

PILULÆ HYDRARGYRI. Of these, I need only observe here, that the usual dose is ten grains. (See *Mercury.*)

PILULÆ HYDBARGYRI OXYDI RUBRI. One grain of this preparation in each pill is the dose, which is commonly taken at bedtime. (See *Mercury.*)

PILULÆ HYDRARGYRI CUM CONIO. ℞. Hydrargyri purificati drach. j. Arabici gummi pulverisati drach. ij. Extracti Conii drach. j. Herbæ Cicutæ foliorum, in pulverem tritorum, q. s. The quicksilver is to be first reduced by triture with the gum arabic, moistened with a little rain water. The inspissated juice of hemlock is afterward to be added, and lastly, the powdered leaves in sufficient quantity to make a suitable mass for pills. These with a slight variation in the proportion of the hemlock, are the *pilulæ mercuriales* of Plenck, who directs three or four pills, each of three grains, to be given every night and morning.

There are, no doubt, many cases, to which this formula must be very suitable; as for instance, the enlarged prostate gland, and some forms of bronchocele, &c. For such diseases. Dr. Saunders, in his *Formulæ Selectæ,* directs equal parts of pil. hydrarg. and extractum conii. (*Pharm. Chir.*)

PILULÆ HYDRARG. SUBMUR. ℞. Hydrarg. Submur. gr. xij. Conservæ Cynosbati quod satis sit. M. fiant pil. xii. These are the calomel pills in common use. Surgeons give one, or two of them daily, as alteratives, in numerous cases. At Guy's Hospital, they add three grains of the pulvis opiatus to each pill, using syrup, instead of the conserve.

PILULÆ HYDRARG. SUBMUR. CUM CONIO. ℞. Hydrarg. Submur. gr. vj. Extracti Conii ʒj. M. fiant pil. xii. One may be given thrice a day, in scirrhous, cancerous, scrofulous, and some anomalous diseases, resembling venereal diseases.

PILULÆ HYDRARGYRI SUBMUR. CUM ANTIMONIO TARTARISATO. ℞. Hydrarg. Submur. ʒj. Antimon. Tart. gr. xv. Opii. Pur. ʒss. Syrupi simpl. q. s. fiant pil. lx. One of these is given twice a day, in St. Thomas's Hospital, in cases of diseased joints. As the author of the *Pharm. Chirurg.* adds, they are also of use in herpetic affections, and obstinate ulcers. The union of antimony with quicksilver, according to Dr. G. Fordyce, quickens the specific operation of the latter.

PILULÆ HYDRARG. SUBMUR. COMPOSITÆ. ℞. Hydrarg. Subm. Sulph. Antim. Præcip. sing. gr. xii. Guaiaci Gummi Resinæ gr. xxiv. Saponis q. s. M. fiant pil. xii. Similar to Plummer's pills. In porrigo, herpetic affections, and many anomalous diseases, they are exceedingly useful. Some diseased enlargements of the breast, and testicle, seem also to be benefited by them.

PILULÆ OPII. These need only be mentioned among such as are of eminent utility in surgery.

PILULÆ OPII COMPOSITÆ. ℞. Opii Purif. Camphoræ, sing. ʒj. Antim. Tart. gr. xv. Syrup. Simpl. q. s. fiant. pil. lx. Used for alleviating pain, and keeping up a gentle perspiration; are particularly useful in preventing painful erections, in cases of gonorrhœa, chordee, &c. (See *Pharm. Chir.*)

PILULÆ PLUMBI ACETATIS. ℞. Plumbi Acetatis gr. xii. Opii Purif. gr. vj. Conserv. Cynosbati q. s. M. fiant pil. xii. One may be given thrice a day. Gleets are, perhaps, the only cases, in which surgeons can employ these pills.

PILULÆ SODÆ CUM SAPONE. ℞. Sodæ ʒj. Saponis ℈j. M. Fiant pil. xii. Four may be given thrice a day, in cases of bronchocele, and indurations of the absorbent glands from scrofula.

PILULÆ ZINCI SULPHATIS. ℞. Zinci Sulphatis, ℨij. Terebinthinæ q. s. Fiant pil. lx. One, or two, are occasionally given, in cases of gleets, thrice a day.

PLANTARIS MUSCLE. This long slender muscle of the leg is said to be sometimes ruptured, particularly in dancing and leaping. The surgeon can do little more than advise rest, and the same posture of the limb, as in the rupture of the tendo Achillis. (See *Tendon.*)

POLYPUS. (from ϖολυς, many, and ϖȣς, a foot.) A kind of tumour, which is generally narrow where it originates, and then becomes wider, somewhat like a pear; which is most commonly met with in the nose, uterus, vagina, andjantrum; and which received its name from an erroneous idea, that it usually had several roots, or feet, like polypi, or zoophites.

Polypi more frequently grow in the cavity of the nose, from the Schneiderean membrane, than any other situation, and are visibly of different kinds; some being red, soft, and sensible; but free from pain, and exactly like a piece of healthy flesh. This, which has been termed the *fleshy polypus*, is the most common, and fortunately the most easy of cure. Other polypi are called *malignant*, being hard, scirrhous, and painful: some are said to be even capable of conversion into carcinoma. Richter describes another kind of nasal polypus, which is pale, very tough, and secretes a viscid discharge; which undergoes an alteration of its size with every change of the weather; and which is rather a relaxation, or elongation, of a part of the Schneiderean membrane, than a polypous excrescence. The whole membranous lining of the nostrils is sometimes relaxed, and thickened in this manner, so as nearly to fill all the cavity of the nose (*Anfangsgr. der Wundarzn. B.* 1, *Kap.* 21.)

Mr. Pott has taken great pains to explain, that there is one kind of polypus, originally *benign;* another originally *malignant.* He states, that those which begin with, or are preceded by considerable, or frequent pain in the forehead and upper part of the nose, and, which, as soon as they can be seen, are either highly red, or of a dark purple colour; those, which from the time of their being first noticed, have never been observed to be sometimes bigger, sometimes less, but have constantly rather increased; those, in which coughing, sneezing, or blowing the nose, gives pain, or produces a very disagreeable sensation in the nostril, or forehead; those which, when within reach, are painful to the touch, or which, upon being slightly touched, are apt to bleed; those which seem to be fixed, and not moveable by the action of blowing the nose, or of driving the air through the affected nostril only (when the polypus is only on one side;) those which are incompressibly hard, and which, when pressed, occasion pain in the corner of the eye, and forehead, and which, if they shed any thing, shed blood; those which by adhesion occupy a very considerable space, and seem to consist of a thickening, or of an enlargement of all the membrane covering the septum narium; those which sometimes shed an ichorous, offensive, discoloured discharge; and those, round whose lower part, within the nose, a probe cannot easily and freely be passed, and that to some height, ought not to be attempted, at least by the forceps, nor indeed by any other means; and this for reasons obviously deducible from the nature and circumstances of the polypus. On the one hand, the very large extent and quantity of adhesion will render extirpation impracticable, even if the disease could be comprehended within the forceps, which it very frequently cannot; and on the other, the malignant nature of the distemper may render all partial removal, all unsuccessful attacks on it, and indeed any degree of irritation, productive of the most disagreeable consequences.

But, the polypi, which are of a palish or grayish light-brown colour, or look like a membrane just going to be sloughy; which are seldom or never painful, nor become so upon being pressed; which have appeared to be at one time larger, at another less, as the air has happened to be moist or dry; which ascend and descend freely by the action of respiration through the nose; which the patient can make to descend by stopping the nostril which is free, or even most free, and then driving the air through that which the polypus possesses; which when pressed give no pain, easily yield to such pressure, become flat thereby, and distil a clear lymph; and round whose lower and visible part a probe can easily, and that to some height, be passed, are fair and fit for extraction; the polypus, in these circumstances, frequently coming away entire: or, if it does not, yet it is removeable without pain, hemorrhage, or hazard of any kind; the second of which circumstances Mr. Pott can with strict truth affirm, he never yet met with when the disease was at all fit for the operation.

Of the benign kind of polypus, fit for extraction, there are (says Mr. Pott) two sorts, whose principal difference from each other consists in their different origin or attachment. That which is most freely moveable within the nostril, upon forcible respiration; which has been found to be most liable to chance of size, at different times and seasons; which has increased the most in the same space of time; which seems most limpid, and most freely yields lymph upon pressure, has its origin most commonly by a stalk or kind of peduncle, which is very small, compared with the size of the polypus. The other which, although plainly moveable, is much less so than the one just mentioned, which has been less liable to alteration from air and seasons; and which has been rather slow in arriving at a very troublesome size, is most frequently an elongation of the membrane covering one of the ossa spongiosa. These latter may be extracted with no kind of hazard, and with very little pain, and hemorrhage: but the former require the least force, and mostly come away entire; while the others often break, come away piecemeal, and stand in need of the repeated use of the forceps. (*Pott, on the Polypus of the Nose.*)

Mr. John Bell criticises the distinctions drawn by the preceding writer, and he says, that a polypus is never mild, and never malignant; time, and the natural growth of the tumour, and the pressure it occasions within the soft and bony cells of the nostrils and jaws, must bring every polypus to one invariable form, in its last and fatal stage. Polypus, says Mr. John Bell, is indeed a dreadful disease; but it becomes so by a slow progression, and advances by gradations easily characterized. Every polypus in its early stage, is, according to this writer, a small moveable tumour, attended with a sneezing and watering of the eyes; swelling in moist weather; descending with the breath; but easily repressed with the point of the finger. It is void of pain, and not at all alarming; it may also be easily extracted, so as to clear for a time the passage for the breath. Yet this little tumour, simple as it may appear, is the germ of a very fatal and loathsome disease, and this easy extraction often the very cause of its appearing in its most malignant form. The more easily it is extracted, (says Mr. J. Bell,) the more easily does it return; and whether carelessly extracted, or altogether neglected, it soon returns. But when it does return, it has not really changed its nature; it has not ceased to be in itself mild, it is then to be feared, not from its malignity, but from its pressure among the delicate cells and membranes of the nose. It soon fills the nostrils, obstructs the breathing, and causes indescribable anxieties. The tears are obstructed, and the eyes become watery from the pressure on the lachrymal sac; the hearing is in like manner injured, by the pressure of the tumour against the mouth of the eustachian tube; the voice is changed, and its resonance and tone entirely lost, by the sound no longer passing through the cells of the nose and face. The swallowing is in some degree affected by the soft palate being depressed by the tumour. The pains arising from such slow and irresistible pressure are unceasing. From the same pressure the bones become carious, and the cells of the face and nose are destroyed by the slow growth of the swelling. It is not long before the tumour begins to project from the nostril in front, and over the arch of the palate behind. One nostril becomes widened and thickened; the nose is turned towards the opposite side of the face, and the whole countenance seems distorted. The root of the nose swells, and becomes puffy, the features tumid and flabby, the face yellow, and the parts round the eye livid. The patient is affected with headachs, which seem to rend the bones asunder, and with perpetual stupor, and dozing. The bones are now absorbed, and the membranes ulcerate; a foul and fetid matter, blackened with blood, is discharged from the nostrils, and excoriates them. The blood-vessels next give way, and sudden impetuous hemorrhages weaken the patient; the teeth fall from the sockets, and through the empty sockets a foul and fetid matter issues from the antrum.

Now the disease verges to its conclusion. The patient has terrible nights, and experiences a sense of suffocation. The repeated loss of blood renders him so weak, that he cannot quit his bed for several days together; and when he does get up, he is (to use Mr. Bell's words) pale as a spectre, his lips colourless, and his face like wax, yellow, and transparent. He now suffers intolerable pain, while his saliva is continually dribbling from his mouth, and a fetid discharge from his nose. In this state, he survives a few weeks; during the last days of his illness, lying in a state of perpetual stupor, and dying lethargic. Mr. J. Bell afterward observes, that "if horrid symptoms could establish the fact of malignity, there is not to be found in all nosology a more malignant disease than this: but aneurism, though it destroys the thigh bone, the sternum, or cranium, is not accounted malignant; neither is polypus malignant, though it destroys the cells of the face, and penetrates even through the ethmoid bone to the brain. These consequences result merely from pressure." (*John Bell's Principles of Surgery, Vol.* 3, *Part* 1, *p.* 90—92.)

In April, 1817, there was a boy in St. Bartholomew's Hospital, only twelve years old, who had just fallen a victim to the ravages of the largest and most disfiguring disease within the nose which I have ever had an opportunity of beholding. The tumour before death had expanded the upper part of the nose to an enormous size, while below the left nostril was immensely enlarged. The distance between the eyes was extraordinary, being more than four inches. The left eye was affected with amaurosis, brought on by the pressure of the swelling; the right retained to the last the faculty of seeing. The tumour nearly covered the mouth, so that food could only be introduced with a spoon, and an examination of the state of the palate was impossible. About a fortnight before death, the leg became paralytic, and during the last week of the boy's existence, an incontinence of the urine and feces prevailed. On examination of the head after death, a good deal of the tumour was found to be of a cartilaginous consistence, and, what was most remarkable, a portion of it, which was as large as an orange, extended within the cranium, where it had annihilated the anterior lobe of the left hemisphere of the brain. Yet, notwithstanding this effect, the boy was not comatose, nor insensible, till a few hours before his decease. All the surrounding bones had been more or less absorbed, and the place from which the excrescence first grew could not be determined.

The celebrated Professor Richter has denied the validity of the objections urged by Pott against attempting to relieve the patient: neither the malignant nature of a polypus, its adhesions, immoveableness, ulcerations, nor disposition to hemorrhage, &c. are, according to Richter, any apology for leaving the disease to itself. (See *Anfangsgr. der Wundarzn. B.* 1, *cap.* 21.)

Mr. J. Bell refutes the common notions, that polypi may be caused by picking the nose, blowing it too forcibly, colds, and local injuries. He asserts, that a polypus is not in general a local, solitary tumour: he has only found it so in three or four instances. Both nostrils are usually affected. He states, that no finger can reach that part of the nostril where the root of the swelling is situated, as it is deep and high in the nostrils, towards the throat, and near the opening of the eustachian tube. The finger cannot be introduced further than the cartilaginous wing of the nose extends, and can hardly touch the anterior point of the lower spongy bone. The anterior and posterior chambers of the nostril are separated from each other by a narrow slit, which the finger can never pass, and which is divided, in consequence of the projection of the lower spongy bone, into two openings, one above, the other below. Through these the heads of the polypus project. These tangible parts of the tumour, however, are very distant from its root, which is in the highest and narrowest part of the nostril. (See *p.* 103, 104.) Mr. J. Bell also says, that three or four polypi are often crowded together in one nostril, while more are formed, or forming, in the other.

He dwells upon the difficulty and impracticableness of tying the root of a polypus; and explains, in all attempts to extirpate such tumours, the surgeon's aim should be to reach a point nearly under the socket of the eye, in the deepest and highest part of the nostrils, and that instruments can only do good when introduced beyond the narrow cleft, formed by the projection of the spongy bone. (*P.* 108.)

Though Mr. John Bell is probably right in his opinion, that polypi do not proceed from the several circumstances which have been above noticed, yet they are, in most instances, diseases of an entirely local nature. Certainly, in general, it is very difficult to describe what is the cause of a nasal polypus. Frequently the patient is, in other respects, perfectly well; and after the removal of the tumour, no new one makes its appearance. In this circumstance, it must originate from a local cause, though it is generally difficult to define what the nature of this is. Sometimes several catarrhal symptoms precede the polypus, and, perhaps, constitute its cause. It is possible, they may only be an effect of the same cause which gives birth to the tumour; but, no doubt, they are sometimes the effect of the polypus itself. Sometimes, perhaps, a faulty state of the constitution really contributes to the disease; for several polypi frequently grow in both nostrils, and even in other situations at the same time; are reproduced immediately after their removal; and the patient often has an unhealthy appearance. Notwithstanding it has been asserted, that a solution of the muriate of ammonia, frequently injected into the nose, sometimes disperses polypi, the efficacy of the remedy remains unestablished by experience; as, indeed, the very nature of the disease might lead one to anticipate. An operation affords the only rational chance of a cure.

There are four modes of extirpating a nasal polypus: viz. extracting it with forceps; tying it with a ligature; cutting it out; and destroying it with caustic.

Extraction is the most common and proper method. It is performed with the ordinary polypus forceps, the blades of which have holes in them, and are internally rather rough, in order that they may take hold of the tumour more firmly, and not easily slip off it. The front edge of each blade must not be too thin and sharp, lest, with its fellow, it should pinch off a portion of the polypus. The blades must necessarily have a certain breadth; for when they are too small, they cannot properly take hold of and twist the tumour. When the handles are rather long, the instrument may be more firmly closed, and more conveniently twisted.

However, the forceps is not applicable to all cases. The anterior part of the polypus, lying in the nostril, distending, and totally obstructing it, is sometimes quite hard, and when the forceps is introduced, it presses the blades in such a manner, from each other, as it lies between them, that the instrument cannot be introduced sufficiently far to take hold of the tumour at a proper depth. If introduced to a proper distance, it cannot be closed. In such a case, says Richter, one might, perhaps, advantageously make use of a pair of forceps, the pieces of which may be separately introduced, and then fastened together again at the joint, and the blades of which diverge from each other behind the joint, and touch again at their extremities. The anterior indurated portion of the polypus lies in the interspace, and does not prevent the closure of the instrument.

It is generally deemed of importance to take hold of the polypus with the forceps close to its root; and, indeed, when this rule is observed, the whole of the polypus, together with its root, is commonly extracted, and there is less reason to apprehend hemorrhage, which is naturally more profuse when the polypus is broken at the thick, middle portion of its body. It is also a rule frequently easy of observance, especially when the polypus is not too large. But in many instances the tumour is so large, and the nostril so completely occupied by it, that it is impracticable to get hold of its root. In this circumstance it is often altogether impossible to discover even where the root lies. Here we must be content to take hold of the polypus as high as possible. The consequences are of two kinds. The tumour sometimes gives way at its root, though it be only taken hold of at its anterior part; and, in other cases, breaks where it is grasped, a portion being left behind, and a profuse hemorrhage ensuing. This is, however, void of danger, if the surgeon does not waste time in endeavouring to suppress the effusion of blood; but immediately introduces the forceps again, grasps the remnant piece, and extracts it. The most infallible method of diminishing the bleeding, is to extract what remains behind at its root. In this way, a large polypus is frequently extracted, piecemeal, without any particular loss of blood.

After the polypus has been propelled as far forward, into the nostrils, as it can be by blowing strongly through the nose, its anterior part is to be taken hold of by a small pair of common forceps, held in the left hand; and is to be drawn gradually and slowly out, to make room for the introduction of the polypus-forceps into the nostril. The more slowly we proceed in this manœuvre, the more the polypus is elongated, the narrower it becomes, the greater is the space in the nostril for the introduction of the polypus-forceps, and the higher can this instrument grasp the tumour. After it has taken hold of the polypus as high as possible, it is to be twisted slowly round, and. at the same time, pulled outward, till the tumour breaks. It is a very important maxim, rather to twist the instrument than to pull it, and thus rather to writhe the polypus off than to drag it out. The longer and more slowly the polypus-forceps is twisted, the more the part where the excrescence separates is bruised, the less is the danger of hemorrhage, and the more certainly does the tumour break at its thinnest part, or root. When the extraction is done with violence and celerity, only a piece is usually brought away, and we run hazard of occasioning a copious bleeding.

As soon as the polypus has given way, the surgeon is to examine whether any part remains behind. When the polypus is very narrow at the place where it has been broken, and the patient can breathe through the nose freely, there is reason to presume that the polypus has given way at its root, and that none continues behind. The finger, if it can be introduced, procures the most certain information; or the probe, when this, for want of room, cannot be employed. The ancients proposed several means for the extirpation of the remaining piece of polypus; but they are, for the most part, objectionable. It is best to introduce the forceps again, under the guidance of the finger, or probe, and thus pinch, and twist off, the part continuing behind.

Hemorrhage invariably succeeds the operation; and by many writers has been represented as exceedingly perilous and alarming. But it is not constantly so, and in some cases is quite insignificant. Frequently, however, it is really serious; and as the surgeon can never know beforehand to what extent it will happen, he is always to furnish himself, before the operation, with the most effectual means for its suppression. The danger of hemorrhage may always be lessened, as was before mentioned, by slowly twisting the polypus at its root, in preference to pulling it directly out. When only a portion of the tumour has been extracted, the surest mode of stopping the effusion of blood is to extract the remaining part without delay. When the polypus has given way at its root, if there should be profuse bleeding, we may first try ice-cold water and strong brandy, which may either be sucked or injected into the nose. This single remedy proves effectual in numerous instances. If the hemorrhage should still prevail, it may always be checked with certainty, how copious soever it may be, in the following manner. Roll a considerable piece of lint, as fast as possible, round the extremity of a probe; wet it completely through with a strong solution of the sulphate of zinc; introduce it into the nostril, and press it as strongly as possible against the part whence the blood issues. When the nostril is very much dilated, the fingers may be used for this purpose with more advantage than the probe. The point from which the blood is effused, may easily be ascertained, by pressing the finger on various points. As soon as the blood ceases to flow, we may conclude that the finger is on the situation of the hemorrhage. This method is so efficacious, that there is seldom occasion for any other. When the bleeding point lies deeply in the nostril, it might be difficult to reach it with the finger. At all events, we may then employ a plan which has been strongly praised in urgent cases.

A piece of catgut may be introduced into the nostril, and by means of a pair of forceps, be brought out of the mouth. A roll of lint is then to be attached to it, and drawn through the mouth into the nose; thus the posterior aperture of the nostril may be stopped up. Then the nostril in front is to be filled with a sufficient quantity of lint, moistened in the solution of zincum vitriolatum.

The objections to extracting some polypi, says Richter, have been much exaggerated. When the polypus is so large, that its root cannot be got at, its anterior part is to be taken hold of, and the tumour extracted piecemeal. It has already been noticed, that this practice is free from danger. Experience does not prove, that the polypus, which often bleeds profusely, is apt to occasion a violent hemorrhage in the operation; and even if it should do so, powerful measures may be adopted for the stoppage of the bleeding. The malignity and ulcerations attending a polypus, are no objections to the operation; but are rather motives for its being promptly performed, as delay must occasion more manifest and urgent danger. If the polypus should be here and there adherent to the membrane investing the nostrils, it is proper to separate it before the operation. This object cannot be accomplished by straight inflexible instruments, such as have been invented by various surgeons. It may be very conveniently done, according to Richter, with thin, long, flat pieces of tortoise-shell, introduced as deeply as possible into the nostril, on every side of the polypus. As it can seldom be known with certainty, *à priori*, that adhesions are not present, it is proper whenever the tumour is large, to introduce these instruments before the operation.

Sometimes, the greatest part of the polypus extends backward, hanging down behind the palatum molle, towards the pharynx. If there should be but little of the polypus visible in the nostril, its extraction must be performed backward, in the throat. This is usually done with a pair of curved polypus forceps, which is to be introduced through the mouth, in order to seize and tear off the tumour as high as possible above the soft palate. Care must be taken not to irritate the root of the tongue, or else a vomiting is produced, which disturbs the operation. When the polypus cannot be properly taken hold of, we may, according to the advice of some surgeons, divide the soft palate. But this is very rarely necessary. As, by this mode, the polypus is not twisted, but pulled away, the hemorrhage is, in general, rather copious. If a fragment of the tumour should remain behind, it may commonly be extracted through the nose.

Some recommend, for the extraction of polypi in the throat, a ring, consisting of two semicircular portions, with a kind of groove externally, which are capable of being opened and shut, by being fixed on the ends of an instrument constructed like forceps. A ligature is to be placed round the ring, and its end is to be brought to the handle of the instrument, and held with it in the hand. The instrument is to be introduced into the mouth, under the polypus, and expanded as much as the size of the tumour requires. Its ring is then to be carried upward, over the polypus, so as to embrace it; and afterward is to be shut, whereby the noose, after being carried upward, is disengaged from the ring. The noose is to be pushed as high as possible over the tumour, by means of forceps, and the extremity of the packthread is then to be drawn, so as to apply the noose tightly round the polypus. When this is done, the ring of the instrument is to be turned round, firmly closed, and placed in front of the polypus, on the noose, in such a way, that the packthread is to lie between two little pegs, made for the purpose, at the ends of the ring. On drawing the packthread firmly, and pressing the instrument at the same time downward, so as to make it act like a lever, the polypus in general easily breaks. Another peg projects in the direction of the ring, so as to prevent the ligature from insinuating itself within the circle. (See *Theden's Bemerk. Part* 2. *and Plate* 6. *fig*. 1. *in Richter's Anfangsgr.*)

The employment of this instrument, however, is attended, says Richter, with many difficulties, and little advantage. Polypi in the throat are most conveniently extracted by the ordinary straight polypus forceps, with which they may be seized, and gradually drawn out through the mouth. The tumour generally allows itself to be drawn out without trouble, and the inclination to vomit, which at this moment occurs, also contributes to propel it outward. When it is so stretched, that it cannot be drawn out further, without considerable force, a spatula is to be introduced into the mouth, and to be carried as high as possible behind the polypus, in order to press it downward, toward the root of the tongue. When the tumour is at the same time forcibly pulled outward by the forceps, it usually gives way.

When the polypus is situated partly in the throat and partly in the nostril, though it admits of being extracted, in the same way, through the mouth, yet its anterior part often continues attached, and must afterward be saparately removed through the nostril. It is also frequently adviseable to twist off the anterior portion of the polypus first, by which the mass in the throat is often rendered so loose, that it can be easily extracted. Whenever it is conjectured, that the polypus will come away in two pieces, it is always preferable first to extract the part in the nostril, and afterward that in the throat: because the separation of the last is constantly productive of more bleeding, than the removal of the first. Sometimes, the following plan succeeds in detaching the whole polypus at once. Both the part in the nostril, and that in the throat, are to be firmly take hold of with the forceps, and drawn at first gently, and then more forcibly, backward and forward. By such repeated movements, the root is not unfrequently broken, and the whole polypus brought away from the mouth.

Frequently the polypus grows again. Policy requires that the patient should be apprized of this beforehand. Some of the root remaining behind, may often be a cause of the relapse. Hence the surgeon should examine carefully, after the operation, the part at which the root of the polypus was situated, and separate, and twist off, most diligently, with the forceps, any fragments that may still continue attached. The recurrence of the disease, however, may arise from other causes. The tumour is occasionally reproduced, after it has been extracted in the most complete manner; and doubtless, this circumstance is sometimes owing to the continued agency of constitutional causes, which so often remain undiscovered and unremoved Sometimes, also, the recurrence of the disease is owing to a local morbid affection of the Schneiderian membrane, or of the bones situated beneath the root of the polypus. Richter, in this case, approves of the cautery; but few English surgeons will coincide with him. The polypus, sometimes observed subsequently to the operation, is frequently not, in fact, a a new substance, but only a part of the original tumour, not previously noticed by the surgeon. Sometimes it occurs, that a smaller and larger polypus are found in the nose at the same time The larger one is extracted, while the other remains undiscovered; and when it has increased in magnitude, it is apt to be mistaken for a reproduction of the one previously extirpated. (See *Richter's Anfangsgr. der Wundarzn, B.* 1. *Kap.* 21.)

Ligature. As the extraction of the polypus is invariably attended with hemorrhage, which is sometimes profuse, another more modern method of cure has been proposed as more convenient and secure. This consists in tying the root of the tumour with a ligature, by which the polypus is thrown into the state of inflammation, suppuration, and sphacelus; and at length becomes detached. Many instruments have been invented for applying the ligature; but Levret's double cannula seems to be the best. Through this, a silver wire is to be introduced, so as to form a noose at the upper end of the instrument, proportioned in size to the anterior part of the tumour, situated in the nostril. The two ends of the wire are to hang out of the two lower apertures of the double cannula; and one of them is to be fastened to a small ring on its own side of the instrument. The other is to remain loose. The wire must be made of the purest silver, and ought to be as flexible as possible, that it may not readily break. It must also not be too thin, lest it should cut through the root of the polypus. The cannula is to be somewhat less than five inches long By the assistance of this cannula, the noose is to be introduced into the nose, and put round the polypus. But as the cannula, which is usually constructed of silver, is straight and inflexible, while the inner surface of the nostril is preternaturally arched, especially when much distended by the polypus, it is easy to discern that its introduction must be attended with considerable difficulty. In fact, it can seldom be introduced as deeply as the root of the polypus. There are two ways of avoiding this obstacle. The cannula may either be passed under the polypus, over the ossa palati, which present a tolerably straight surface, or it must be curved a little. Perhaps, a tortoise-shell cannula, says Richter, might be convenient.

The noose is to be applied in the following manner. The polypus is to be taken hold of with the forceps, and drawn a little out of the nose. The noose is then to be carried over the forceps and polypus, into the nostril. In order to carry it as high as possible, it is necessary not to push the cannula straight forwards into the nose, but to move it from one side of the polypus to the other. The more deeply the instrument has entered the nose, the more of the loose end of the wire must be drawn out of the lower aperture of the cannula, so as to contract the noose, which otherwise might stop in the nostril, and not be carried sufficiently high. The elasticity of the silver wire tends to assist in raising it over the polypus, and hence, it is more easy of application than a more flaccid kind of a ligature. When there is cause to conclude, that the polypus is complicated with adhesions, they must be previously broken, in the way already mentioned.

As soon as the noose has been introduced as deeply as possible, the loose extremity of the wire is to be drawn out of the lower aperture of the cannula, and rolled round the ring on that side of the instrument. Thus the root of the polypus suffers constriction. The wire must not be pulled too forcibly, nor yet too feebly. In the first circumstance, it readily cuts through the root of the polypus; in the second, great tumefaction of the excrescence, and many inconveniences arise, which a tenser state of the wire prevents. As the noose gradually makes a furrow where it surrounds the polypus, it grows slack after a short time, and no longer constricts the tumour. One end of the wire, therefore, is to be daily unfastened, and drawn more tightly. The more tense it is kept, the sooner the separation of the polypus is brought about. Hence, when it is particularly indicated to produce a speedy attachment of the polypus, the wire should be tightened, at least, once a day.

In this mannner the cannula is to remain in the nose until the noose is detached, together with the polypus. There is another method of tying the tumour, without leaving the cannula in the nose. After the noose has been introduced as far as possible into the nostril, the two ends of the wire are to be twisted round the two rings, and the cannula is to be turned round a couple of times. The wire is then to be unfastened from the rings, and the cannula withdrawn. In this way the noose is made to embrace the polypus, round which it remains fastly applied. Whenever it is wished to produce a greater constriction, the cannula may be again introduced into the nose, the ends of the wire fastened to the rings, and the instrument turned round again; after which it is to be taken away, as before. As the cannula, when it continues long in the nose, may occasion pain, and other inconveniences, the last method seems preferable to the former. However, introducing and withdrawing the cannula every day, as Richter adds, may, perhaps, be equally troublesome and painful. The cannula for this purpose being necessarily straight, is by no means handy. One might, at all events, make use of a single cannula, the upper opening of which is divided by a bridge; this could be much more conveniently twisted than a double one.

Although the ligature has been very much praised by some of the moderns, it is attended with so many difficulties, that in the majority of cases, the forceps is infinitely preferable. Hemorrhage is the only inconvenience, for which extraction is abandoned for the employment of the ligature. But this, as was before stated, is much less dangerous than is represented. The inconveniences of the ligature are far more serious, and numerous. The cure by the ligature is always accomplished with much less expedition than by extraction. When the polypus is of such a size as to occupy the whole of the nostril, it is generally impracticable to introduce the noose to a sufficient depth.

The figure of the polypus renders it almost impossible to tie its root; for commonly the tumour expands very much before and behind, and the wire must be brought over the posterior part of the polypus, ere it can be applied to its root. In general, also, the noose only includes the front part of the polypus, while the root, and back portion remain untied, and consequently do not become detached.—It is, indeed, asserted, that the ligature, when only applied to the front part of the polypus, is capable of bringing about inflammation, suppuration, and a detachment of the whole of the tumour. This may sometimes be the case; but analogous instances prove, that it is undoubtedly not constantly so. The ligature seldom accomplishes an entire destruction of the disease, and there is usually reason to apprehend its recurrence. If the polypus be very large, and the whole nostril occupied, it is frequently utterly impossible to introduce the wire; and when this is done, the front of the tumour alone can be tied.

The polypus nasi is commonly highly sensible, and consequently, tying it proves very painful. As soon as the noose is drawn tight, not only the polypus inflames, but the whole extent of the Schneiderian membrane. The pain and inflammation often extend even to parts at some distance, such as the throat, eyes, &c. occasioning acute fever, which requires the strict observance of low diet, the exhibition of cooling physic, and the evacuation of blood Hence, it is adviseable in many cases, to prepare patients for this treatment, by diet and medicines.

When the polypus is tied, it swells very much, and all the complaints which it previously caused are exasperated. But, in particular, the part situated in the throat, sometimes obstructs deglutition and respiration, in such a degree, that prompt relief becomes necessary; and one of the best plans for affording it, is to make a few punctures in the tumour. These excite a bleeding, that very speedily lessens the swelling, but is sometimes difficult to check. Hemorrhage from a part of the polypus that is tied, is most effectually stopped by twisting the wire so tight, that it closes the arteries distributed to it.

The wire sometimes breaks off close to the lower aperture of the cannula, in consequence of being twisted so much and thus the progress of the cure is interrupted. A new wire may be introduced; but it is difficult to apply it exactly in the situation of the other. A fresh place is commonly tied, which is almost the same thing as commencing the cure anew. It is better to prevent this interruption of the treatment by employing very flexible wire, made of the purest silver; and by not twisting and untwisting regularly the same extremity of it, but sometimes one and sometimes the other. A strong piece of catgut might be a very good substitute for silver wire.

Immediately the polypus is tied, it swells, inflames, and becomes painful; in a few days, it becomes shrunk, free from pain, and sphacelated. The fetid discharge now occasions considerable inconvenience to the patient, and ought to be washed away by repeated injections. Towards the termination of the case, the surgeon ought to take hold of the polypus with the forceps, to try whether any of it is loose. When the polypus is extracted, one may inject a solution of alum, for a day or two afterward, in order to diminish the effect of the irritating discharge on the Schneiderian membrane, and the suppuration in the situation of the ligature, as it is sometimes profuse, and of long duration.

Though one might also tie polypous tumours in the throat; and, indeed, the introduction of the cannula through the mouth, and the application of the noose, would be attended with no great difficulty; and, though the treatment might be rendered more tolerable to the patient, by withdrawing the cannula after twisting the wire; yet, the swelling of the tied portion of the tumour would, probably, create immense inconvenience. In this case, therefore, extraction usually merits the preference, and the ligature is only fit to be practised in the throat, when the polypus is very small, or there is some especial cause forbidding extraction. When deglutition and respiration are impeded by the swelling of the tied portion of the polypus in the throat, the swollen part must be scarified by means of the pharyngotomus, so as to excite a bleeding, and thereby produce a diminution of the swelling. The noose is to be frequently and strongly tightened, in order to accelerate the detachment of the polypus, and shorten the inconveniences. When the excrescence has not only descended towards the pharynx, but also into the nostril, its front portion is to be tied first. The result of this may be, such an inflammation and suppuration of the whole polypus, that, after the separation of its anterior portion, the posterior one may also become detached, or at least, easy of removal.

Caustics. The cautery, formerly recommended for the cure of the polypus nasi, is now almost entirely rejected, and, indeed, in the manner it was customary to use it, little good could be done. It was applied to the anterior surface of the tumour in the nostril, and its employment was repeated every time the slough separated. Its operation could naturally be but of small extent, as it only came into contact with a trivial portion of the polypus. Its irritation augmented the determination of blood to the excrescence, and accelerated its growth; while as much of the the tumour was reproduced ere the slough separated, as was thus destroyed; and the design of completely extirpating the disease, in this way, seldom or never proved successful. However, says Richter, there is one particular example, where the cautery is the only means from which relief can be derived; and, used in a certain way, it always speedily produces the desired effect.

There are some nasal polypi, much disposed to profuse bleeding. Touching them in the gentlest manner, and every trivial concussion of the body, give rise to hemorrhage. The patient is exceedingly debilitated by repeated loss of blood; his countenance is pallid; his feet swollen; he is affected with hectic fever; and faints whenever there is any considerable bleeding. Doubtless, extraction, in this case, is a very precarious method, as the patient is so circumstanced, that any copious effusion of blood must be highly perilous. Sometimes the polypus is, at the same time, so large, and the nostril so completely occupied and distended, that it is impossible to apply a ligature. Such is the case, to which alone the cautery promises assistance. (*Richter.*)

In employing the cautery, (says the latter author,) the object is not to effect, by its direct agency, a gradual destruction of the polypus; but to excite such an inflammation, and suppuration, of the whole of it, as shall lead to this event. To fulfil this purpose, a common trocar, three inches long, may be used. The cannula ought to be two inches shorter than the trocar, whereby the latter may protrude from it so far; and it should be constructed with a handle. The cannula should be made wider than it is in common, so as to allow the trocar to be introduced, and withdrawn with facility. It is to be wrapt round with a piece of wet linen, and applied to the polypus. The red-hot trocar is then to be pushed into the tumour, as far as the cannula will allow it, which is, of course, two inches.

When the patient entertains a dread of the actual cautery, Richter sanctions the introduction of a tent of the emplastrum cantharidum, or a tent smeared with butter of antimony, into the puncture of the unheated trocar, and as soon as suppuration has taken place, emollient and detergent lotions are to be injected. (*Richter's Anfangsgr.*) In England, the actual and potential cauteries are never used for the destruction of nasal polypi.

Excision. In the treatment of the polypus, the use of cutting instruments has always been reprobated, because they usually occasion a profuse hemorrhage, and can hardly ever be passed, without mischief, to a sufficient depth into the nose to divide the root of the tumour. Yet there are instances in which their use might be productive of advantage. The anterior part of the polypus, situated in the nostril, is sometimes so thick and hard that it is utterly impracticable to introduce the forceps for the performance of extraction, or the cannula for the application of the ligature. In such a case, it might be a judicious step to cut off the front of the polypus with a sharp instrument, of a suitable shape, in order to make room for the use of the ligature, or forceps. The polypus is sometimes of a ligamentous structure, and neither admits of being tied nor extracted. There is no means of removing such a polypus except the knife, by which it is to be cut away piecemeal.

Mr. Whately, after failing in several attempts to extract and tie a considerable polypus of the nose, succeeded in cutting it out. He used "a narrow, straight bistoury, with a probe point, having a sheath fixed upon its edge, by a screw put into a hole in the handle. An eye was made at its point, to receive one end of a thread intended to be passed round the polypus, for the purpose of directing the knife to the extremity of the tumour. There was also a contrivance by which the knife could be unsheathed at its extremity, the length of three-quarters of an inch. This was done by means of a screw, which might be fixed in another hole, by drawing back the sheath. By exposing such a length of edge only, the interior parts of the nose were defended from the danger of being wounded." Whoever wishes a particular account of the manner of using the instrument, must consult Mr. Whately's *Cases of two extraordinary Polypi. &c.* 1805.

In the polypus which arises from a relaxation of the Schneiderian membrane, external astringent applications may be first tried; such as ice-cold water, solutions of acetite of lead, alum, muriate of ammonia, &c. These remedies (says Richter) commonly lessen it, and frequently, when it is not very large, accomplish its entire removal. If this should not happen, there is no reason against putting a ligature round it. Here, also, we may venture to employ a cutting instrument, if it be in our power to do so; which, as far as my experience goes, will very rarely be the case. But the practice of extraction is here prohibited.

When the Schneiderian membrane is preternaturally swollen all over the nostril, which is quite obstructed, the pervious state of the cavity is to be restored by the introduction of catgut or bougies. A thin piece is at first passed into the nose, and afterward a larger and larger one gradually, until the passage for the air is perfectly re-established. But usually, this relief is only of short duration, as the nostril very soon closes again. Hence, such patients are advised to make constant use of flexible tubes passed into the nose; or, when this is too troublesome, to fill the nose regularly at bedtime with catgut, and take it out again in the morning. (See *Richter's Anfangsgr. B.* 1.)

POLYPI OF THE UTERUS.

Polypi of the uterus are of three kinds, in respect to situation: they grow either from the fundus, the inside of the cervix, or the lower edge of the os uteri. The first case is the most frequent; the last the most uncommon. Polypi of the uterus are always shaped like a pear, and have a thin pedicle. They are almost invariably of that species, which is denominated fleshy, hardly ever being scirrhous, cancerous, or ulcerated.

A polypus of the first kind, growing from the fundus uteri, is very difficult to detect in its incipient state. While small, it produces not the smallest perceptible change in the organs of generation. As it enlarges, it distends the uterus, and often excites a suspicion of pregnancy, which, however, a more attentive examination soon dispels. The swelling of the abdomen does not take place in the degree and space of time, which it does in pregnancy; the menstrual discharge continues to flow; the breasts do not become full; and, in the progress of the case, no motion is to be felt. While the polypus lies in the uterus, its growth is slow. At this early period it frequently occasions profuse bleeding. Women, afflicted with the disease, are seldom pregnant, and when they are so, parturition commonly happens prematurely. However, they sometimes hold out to the end of the regular time, and experience an easy and safe delivery.

As the polypus increases, it expands the os uteri, and at length protrudes into the vagina. This takes place either suddenly, from an accidental concussion of the body; or slowly and gradually. In the latter circumstance, pains similar to those of labour occur, and cause the tumour to be expelled into the vagina. As soon as it has arrived in this situation, and is no longer confined and compressed by the uterus, it begins to grow more rapidly, and gives rise to far more troublesome complaints; for it presses the bladder and rectum, and thus, more or less, disturbs the evacuation of the urine and feces. But in particular, it causes repeated and profuse hemorrhages, which weaken the patient exceedingly, and often bring her to the brink of the grave. The root of the polypus is situated in the os uteri, and is there so compressed, that the blood in the tumour is prevented from returning through the veins; consequently, all the vessels become turgid, and the above effusions of blood are the result. Though they generally cease spontaneously, the least circumstances cause their recurrence; such as slight concussions of the body in riding, walking, &c. In the mean while, a quantity of mucous and aqueous fluid is voided, by which the patient's strength is more reduced. The polypus, the source of this blood and mucus, is frequently misunderstood, and the patient is in a perilous state. So necessary is it in cases of preternatural discharge from the uterus, always to examine with the finger, *per vaginam.*

At length, after the polypus has been some time in the vagina, it begins to protrude externally. This happens gradually or suddenly, from some effort or concussion of the body. Hence additional grievances are again excited. As the polypus cannot descend so low without dragging the fundus of the uterus downward with it, and occasioning a prolapsus of this organ, the patient, in walking or standing, commonly experiences a very painful sense of dragging or stretching, in the pelvis. As the bladder and ureters are also forced into a deranged position, the evacuation of urine is, more or less, disturbed, or rendered difficult. Lastly, the dribbling of the urine over the polypus, and the friction which the part accidentally suffers, frequently cause it to inflame, and become painful, and ulcerated.

A polypus, situated in the vagina, or protruding from it externally, may easily be mistaken for a prolapsus uteri; an error which, though not difficult to avoid when a careful examination is made, may have very perilous consequences. The polypus is softer and less sensible than the uterus in the state of a prolapsus. The imperfect prolapsus uteri, in which this viscus is not turned inside out, is betrayed by the os tincæ, at the lower part of which it is plainly perceptible. In this situation, the polypus may occasionally have a depression resembling the mouth of the womb, but easy of discrimination from it. A probe can be passed deeply into the os uteri; but, not so into this other opening. The polypus resembles an inverted pear, that is, it is thickest below, and becomes gradually thinner upward. The above species of the prolapsus uteri is thinnest below, and gradually increases in width upward. The fallen uterus may easily be pressed back, and when it is so, the patient experiences relief. The polypus does not admit of being pressed back, and, during an attempt to do this, the patient is put to much inconvenience. A probe may be introduced by the side of the polypus deeply to the fundus uteri. When passed by the side of the fallen uterus, it is very soon stopped at the upper part of the vagina, which has sunk down with the cervix of this organ.

A polypus, protruding externally from the vagina, may be much more easily distinguished from a perfect prolapsus uteri, without inversion. The os uteri at once characterizes the uterus, as it can here not only be felt, but seen. A probe may be passed deeply into the vagina, along the side of the polypus; but, not so by the side of the uterus, for reasons easy of comprehension. The figure of the tumour, and the state of the patient, on an effort being made to reduce the protruded part, also betray its real nature.

The inversio uteri is usually the consequence of a difficult labour, and hence is easily discriminated from a polypus, by its occasional cause. While the inverted uterus lies in the vagina, its shape is broad above and narrow below; whereas the polypus is thin above and broad below. Hence in cases of very large polypi in the vagina, the os uteri is but little dilated; while it is extremely distended by the incomplete descent of the inverted uterus itself. Here, likewise, the reduction of the part is attended with relief; while every effort to push back a polypus causes an aggravation of all the complaints.

When the inverted uterus hangs out of the vagina, its figure, like that of the polypus, is thin upward, and broad downward; and, like the latter tumour, has no aperture at its lowest part. Here, an erroneous opinion is very liable to be formed. An attentive observer, however, will easily avoid it. The inverted uterus includes a circular fold at its upper part, next to the orifice of the vagina. This fold is nothing less than the os uteri itself, through which the body of this viscus has descended. There is nothing of this kind to be felt in cases of polypi. By the side of a polypus the finger or probe may be passed deeply into the vagina; but not so by the side of the uterus. The root of the polypus is firm and hard to the touch; the upper thin part of the uterus, which is hollow, has a soft flabby feel. Useful light is also generally thrown on the case, by the above-mentioned occasional cause of the prolapsus uteri with inversion. However, in particular cases, the diagnosis is much more difficult, and the observations of a modern writer fully prove that it is always difficult, and perhaps sometimes impossible to distinguish a *partial* and *chronic* inversion of the uterus from a polypus. (*W. Newnham, Essay on the Symptoms, Causes, and Treatment of Inversio Uteri, with the History of the successful Extirpation of that Organ during the Chronic Stage of the Disease, p. 82, &c. 8vo. Lond.* 1818; *also First Lines of the Practice of Surgery, Vol. 2, p.* 317.)

In the two last descriptions of uterine polypi, situated either on the inside of the cervix, or at the margin of the os uteri, the disease is, as it were, from its commencement in the vagina, and the tumour, when large, produces all the complaints attending polypi of the first kind, except frequent profuse bleedings. These seldom occur, and when they do, are slight, because the root of the polypus suffers no constriction in the os uteri. As the tumour descends out of the vagina, it occasions a prolapsus uteri without inversion, in addition to the other inconveniences.

Experience proves that uterine polypi, when once extirpated, have not that propensity to be reproduced, which those of the nose have. Here, for obvious reasons, extraction is not the right practice. Sometimes, however, uterine polypi are met with which have such a thin and soft pedicle, that, although they ought not to be pulled out, they admit of being twisted off with facility and safety. Also, numerous complaints of a serious nature are occasionally the result of tying a polypus of the uterus. In this circumstance, after the ligature has been applied some days, an attempt may be made to shotten such complaints, by twisting off the tumour altogether. This object is most conveniently performed with a pair of forceps made something like Smellie's midwifery forceps. As the part of the polypus in the ligature is constricted, thin, and already partly detached, the tumour, with a little caution, may frequently be easily twisted off, without any material bleeding.

The ligature is the most proper means of extirpating uterine polypi, and is here much more easy of application, than in the nose. Large as the polypus may be, there is always abundance of room for the introduction of the necessary instruments. The polypus of the uterus has commonly a thinner pedicle than that of the nose; hence its cure by the ligature is more expeditious; and on account of the greater room and more yielding nature of the parts, the swelling of the tumour, after the ligature is applied, produces less inconvenience than in the same mode of treatment of nasal polypi. The inconveniences which do arise are easy of removal; for instance, the retention of urine may be relieved by the catheter; costiveness by clysters, &c. Uterine are also less sensible than nasal polypi; and hence, less pain and fever follow the application of a ligature to them. The fetid matter, formed as soon as the polypus sphacelates, has a free vent out, and may easily be washed away by injections.

That the polypus cannot be tied while it lies in the uterus, is easily comprehensible. But immediately it has descended into the vagina, the operation may be undertaken, and may be performed with the same kind of double cannula, as was employed in the nose. However, here it is extremely requisite that the cannula should be rather longer than that already described, and somewhat curved. But, as the silver wire sometimes breaks, two other very convenient instruments have been invented.

The first is Levret's instrument. It consists of two silver cannulæ, which are curved in such a manner, and so united by a joint, that they are shaped like a pair of forceps. After introducing a ligature through the two tubes, so that its ends hang out of their lower apertures, the instrument is to be shut, and passed upwards into the vagina, over the polypus, on whichever side seems most convenient. Then it is to be opened, and the polypus is to be pushed through the two branches of the instrument, which is to be brought over the opposite side of the tumour. In doing this, the ligature becomes applied round the root of the polypus, and forms a noose. The extremities of the ligature are next drawn as tightly as possible out of the lower openings of the cannulæ, and tied first in a surgical knot, and then in a slip-knot. The instrument is then shut, and the ligature constricts the root of the polypus. Afterward it is to be tightened daily, until the tumour separates.

It is plain that this instrument has some defects, which, however, are easily amended. It is very inconvenient that the surgeon should be obliged to have several such instruments of various sizes and curvatures, so as to be able to select that which seems most calculated for the magnitude and shape of the polypus. And, as the size and figure of the polypus cannot always be ascertained beforehand, it is often indispensable to try several instruments, ere the most suitable one is found out, and such fruitless attempts must be distressing and painful to the patient. The worst is, that though the upper ends of the instrument were to touch, when the lower are tied together, yet there would always be a space between the two apertures, where no ligature would be applied to the root of the polypus, and where, consequently, its separation would not easily be accomplished. The tubes may also bend with the force used in applying them, and the pain caused by the expansion of the instrument would then be very considerably increased.

All these defects are done away in the instrument described by Nissen, *de polypis uteri*, (See *Richter's Chir. Bibl.* 9. *B. S.* 613.) It consists of two silver tubes, twelve inches in length, and as thick as an ordinary writing pen. Both are curved about as much as the os sacrum; but, as they are made of pure silver, the curvature may easily be increased or diminished, according to circumstances. Through each of the cannulæ a strong ligature is to be passed, so that its ends hang out of the lower apertures, while its middle portion forms a noose between the upper apertures of the cannulæ.

The tubes are to be kept together until they have been introduced into the vagina, as far as the root of the polypus. One is then to be held fast, while the other is to be carried round the tumour, to the opposite side of the cannulæ that remains stationary. Thus the ligature becomes applied round the root of the polypus. After introducing the finger into the vagina, to ascertain that the ligature lies in its proper situation, its ends are to be drawn through a small double cannula, which is only one-third of an inch long, but so wide that it can be pushed over both the tubes a certain way with the finger, and the upper end of the long cannulæ with the aid of a sort of long probe, with a forked extremity. Then a third double cannula, through which the ends of the ligatures have likewise been passed, and the width of which is sufficient, is to be pushed over the lower ends of the long cannulæ so as to unite them. The ligatures are next to be drawn tight in the ordinary way, and fastened to the rings. The management of this instrument is so easy as to need no further explanation.

Besides the above instruments, many others have been devised and recommended for tying polypi of the uterus. In particular, one invented by Desault, claims the attention of such surgeons as wish to be informed of others.

Acute symptoms frequently follow the application of the ligature, and are either of an inflammatory or spasmodic kind. The former require antiphlogistic treatment. Sometimes fever arises, and the polypus becomes exceedingly painful; in this case, venesection is necessary. Spasmodic symptoms require the exhibition of opium. When this is ineffectual, and the symptoms are severe, it may be proper to slacken the ligature a little. As the polypus at first always swells, it produces great pressure on the adjacent parts. For this reason, it is generally necessary, for the first few days, to draw off the urine with the catheter, and to open the bowels with clysters. Sometimes hemorrhage takes place. This may generally be suppressed with astringents; but when they prove ineffectual, tying the ligature more tightly answers the purpose. The rest of the treatment resembles that of nasal polypi.

When the polypus is large, it is often necessary in the end to use forceps for its extraction. The inflammation, or ulceration, liable to be occasioned in the vagina during the treatment, requires injections and antiphlogistic remedies. As the ligature is generally applied round the pedicle, close to the os uteri, and seldom to the very root of the polypus, usually situated at the fundus uteri, a portion of the root almost always remains behind, after the tumour has separated; but, in all probability, it afterward diminishes and falls off, and however this may be, it is an undoubted fact, that a polypus uteri is seldom reproduced. (*Richter.*)

This author observes, that cutting instruments are, in general, improper for polypi of the uterus, as their employment would injure the vagina, and for the most part, occasion a dangerous hemorrhage. However, there is one case where the knife is indispensable. The polypus has occasionally a ligamentous pedicle, and consequently can neither be tied nor extracted. This circumstance is usually undiscovered till after a ligature has been applied, which here commonly produces extraordinary pain, and though it be applied ever so long and forcibly, occasions no detachment of the polypus. In this instance, the surgeon may either cut off the polypus closely to its root in the vagina; or he may first draw it gradually downward out of this situation, and then remove it: perhaps the first object might be performed with a sharp hook, somewhat curved at its side, and similar to what is used for tearing the fœtus piecemeal in the uterus; or with what seems better, a pair of long curved, blunt-pointed scissors. The last object may be accomplished with an instrument resembling Smellie's midwifery forceps, which is to be introduced into the vagina in the ordinary way. The polypus is then to be taken hold of, and gradually drawn so far out of the vagina, that its pedicle may be divided with a knife. This is, indeed, not done without pain, and a forcible inversion of the uterus; but it may be executed without dangerous consequences. When a polypus, whose root is attached to the fundus uteri, lies in the vagina, the uterus is always, in some degree, inverted beforehand; and this state is, therefore, only increased by the foregoing plan, which does not create danger when done slowly and cautiously. It is a plan which has been successfully practised. (See *Herbiniaux, Parallèle des différens Instrumens pour la Ligâture des Polypes.*)

When a polypus that has its pedicle attached to the fundus uteri, suddenly falls downward, it occasions a sudden inversion of this viscus. In order to relieve, as speedily as possible, the great pain and danger of this case, the surgeon must tie the root of the polypus as soon and as firmly as he can, and pass the ligature, by means of a needle through the pedicle, before the place where it is tied, allowing the ends afterward to hang down for some length. Then the polypus is to be amputated below the ligature, and the uterus immediately reduced. This is another example, where a cutting instrument may be used with advantage. The ordinary method of tying such tumours, so situated, accomplishes only a slow detachment of them, and does not afford relief with sufficient expedition.

Fleshy excrescences also occasionally form in the vagina, some of which have a broad basis, and others a thin pedicle. The last merit the appellation of polypi. Their existence is easily ascertained by the touch. By making pressure on the bladder and rectum, they occasion several impediments to the evacuation of the urine and feces. They may be conveniently tied, by means of the double cannula. Should the polypus be situated at the lower part of the vagina, the cannulæ would not be required. The ligature might be applied with the hand, and the tumour cut off below the constricted part.

There is still another kind of tumour in the vagina, to be classed in the rank of polypi. It resembles, in many points, the polypus of the mucous membrane of the nostril, consisting altogether of the membranous lining of the vagina, which, at the part affected, becomes relaxed, thickened, and elongated; hence the tumour might be more properly termed a *prolapsus of the membranous lining of the vagina*, than a polypus. When it resists the efficacy of astringent and corroborant injections, it may be tied, or what is better, cut off.

A polypus in the œsophagus renders deglutition difficult; and when of large size, puts an entire stop to it. When an inclination to vomit is excited by irritating the throat with the finger, or a feather, the polypus, if situated towards the upper part of the tube, ascends into the mouth, so as to become visible. But as it impedes respiration during its residence in the mouth, the patient is soon necessitated, as it were, to swallow it again. When the polypus is situated far down the œsophagus, of course it cannot be brought into the mouth, and is very difficult to detect. The difficulty of swallowing, its only symptom, may result from other causes. In this case it is also incurable; for it is impossible to take hold of it with instruments. An operation can only be practised, when the polypus is situated in the upper part of the œsophagus. The tumour cannot be extracted; and the tying of it is difficult.

Polypi in the rectum may be tied with the aid of the cannulæ. Excrescences in the meatus auditorius externus, resembling polypi, have been successfully extirpated by extraction, or rather by twisting them off.

For many of the foregoing remarks, I am indebted to Richter, who has very ably treated of polypi in his *Ansfangsg. der Wundarzn. B.* 1, *Kap.* 21. See also *J. B. de Lamsweerde, Historia Naturalis Malorum Uteri*, 12*mo. Lugd.* 1700. *P. G. Schacher, Programma de Polypis, Lips.* 1721. *C. F. Kaltschmid, De Mola scirrhosa in utero inverso extirpata, Jenæ*, 1754. *C. Schunck, De polypo post febrem Epidemicum ex utero egresso. Wittemb.* 1739. *A. Levret, Obs. sur la Cure radicale de plusieurs Polypes de la Matrice, de la Gorge, et du Nez. 8vo. Paris*, 1749. *M. G. Herbiniaux, Traité sur divers Accouchemens laborieux, et sur les polypes de la Matrice, &c.* 2 *Tom. 8vo. Bruzelles*, 1782—1794. *E. Grainger, Medical and Surgical Remarks, including a description of a simple and effectual method of removing polypi from the uterus, &c. 8vo. Lond* 1815. *Denman's Plates of a Polypus. with an Inversion of the Uterus, and of a Polypus of the Uterus, fol.* 1801. *F. A. Walter, Annotationes Academicæ. 4to Berol.* 1786. *W. Newnham, An Essay on the Symptoms, &c. of Inversio Uteri, with a History of the successful Extirpation of that Organ, 8vo. Lond.* 1818. *Pott's Remarks on the Polypus of the Nose. Whately's Two Cases of extraordinary Polypi, 8vo. Lond.* 1805. *John Bell's Principles of Surgery, Vol.* 3, *Part* 1. *Encyclopédie Méthodique, Art. Polype. J. G. Haase, De Narium Morbis Comment. Lips.* 1794—1797. *Lassus, Pathologie Chir. T.* 1, *p.* 528—538, *&c. Edit.* 1809. *Callisen's Systema Chirurgiæ Hodiernæ, Vol.* 2, *p.* 169, *&c. J. L. Deschamps, Traité des Maladies des Fosses Nasales, et de leur Sinus, 8vo. Paris*, 1804. *Nauche, des Mal. de l'Uterus, 8vo. Paris*, 1816. *S. Schmeider, Schediasma de Polypo Œsophagi vermiformi rarissimo, &c. Delitii*, 1717. See *Halleri Disp. Morb.* 7, 595.

PORRIGO. TINEA CAPITIS, (called also *Ringworm of the Scalp, Scald-head, &c.*) is, according to Dr. Bateman's excellent account of the subject, a contagious disease, principally characterized by an eruption of of the pustules denominated *favi* and *achores*. The *achor* is defined to be a small acuminated pustule, containing a straw-coloured matter, which has the appearance and nearly the consistence of honey, and is succeeded by a thin brown or yellowish scab. The *favus* is larger, flatter, and not acuminated, and contains a more viscid matter; its base, which is often irregular, is slightly inflamed; and it is succeeded by a yellow, semitransparent, and sometimes cellular scab, like a honey-comb; whence it has obtained its name. (See *Bateman's Synopsis of Cutaneous Diseases, p.* xxiv. *and* 159, *Edit.* 3.)

This intelligent physician has noticed six species of Porrigo, of which my limits will allow me to give only a very abridged description.

1. The *Porrigo larvalis*, or *crusta lactea* of authors, begins with an eruption of numerous minute whitish *achores*, upon a red surface. These pustules soon break, and discharge a viscid fluid, which concretes into thin yellowish or greenish scabs. The disease increases in extent, and the scabs become thicker and larger, until the forehead and cheeks, even the whole face, excepting the eyelids and nose, become enveloped, as it were, in a mask, whence the epithet *larvalis*. Small patches of the disease sometimes

appear about the neck and breast, and on the extremities; and the ears and scalp are usually affected in the progress of the case. The infant suffers more or less from the itching and irritation. When the discharge is copious and acrid, Dr. Bateman recommends the part to be washed two or three times a day with tepid milk and water, and the application of the unguentum zinci alone, or mixed with the saturnine cerate. The latter, he says, will be useful for the relief of the excoriation left after the cessation of the discharge. Small doses of the submuriate of mercury, either alone, or in combination with a testaceous powder, will also expedite the cure. If the bowels are very irritable, the hydrargyrus cum creta, or the cinereous oxide, may be exhibited instead of the calomel. When the health is good, soda, precipitated sulphur, and the testacea, will lessen the local inflammation and discharge.

When the irritation is removed, and the crusts are dry and falling off, the unguentum hydrarg. nitrat. much diluted, may be used, and the decoction of bark, or the vinum ferri prescribed.

2. *Porrigo furfurans* begins with an eruption of small *achores:* The excoriation is slight, and the discharge, which is not abundant, soon concretes and falls off in innumerable thin laminated scabs. At irregular periods fresh pustules arise, and follow the course of the preceding. The complaint is confined to the scalp, which is affected with itching and soreness; and the hair, which partly falls off, becomes thin, less strong, and sometimes of a lighter colour than natural. This species of porrigo occurs principally in adults, and it is sometimes attended with swelling of the glands in the neck. Dr. Bateman observes, that the treatment requires the hair to be closely cut off the scalp. The branny scabs are then to be gently washed away with some mild soap and water twice a day; and an oil silk cap should be worn. In the beginning, when the surface is moist, tender, and inflamed, the zinc ointment, or one made with ʒij. of the cocculus indicus and ℥j. of lard. Afterward, when the scalp is dry and free from irritation, it may be washed with common soft soap and water; or with a mixture of equal parts of soft soap and unguentum sulphuris. Then the unguentum hydrargyri nitrati, the ung. hydrarg. nitrico oxydi, the tar and sulphur ointments, or the ung. acidi nitrosi of the Edinb. Pharm. may be employed. These last stimulant applications, however, must be left off, if the inflammation and discharge return.

3. *Porrigo lupinosa* is characterized, according to Dr. Bateman, by dry, circular, yellowish white scabs, set deeply in the skin, with elevated edges, and a central depression, and somewhat resembling, on the whole, the seeds of lupines. These scabs are formed upon the separate clusters of *achores*, and attain on the scalp the size of a sixpence; but when on the extremities, they are not more than two lines in diameter.

In the treatment of the porrigo lupinosa the scabs are first to be gently washed off with some soap and water, and the scalp is to be shaved, if it be the part affected. When the scabs are difficult of removal, the liquor potassæ, or a weak lotion of muriatic acid may be used for loosening them. Then the ointment of cocculus indicus is to be applied to the red cuticle, and afterward any of the more stimulant ointments above enumerated.

4. *Porrigo Scutulata*, or *ringworm of the Scalp*, as Dr. Bateman has observed, makes its appearance in separate patches, of an irregular circular shape, upon the scalp, forehead, and neck. It commences with clusters of small, light-yellow pustules, which soon break, and form thin scabs, which, if neglected, become thick and hard. If the scabs are removed, however, the surface underneath is left red and shining, but studded with slightly elevated points or pustules. When the disorder is neglected, the patches become confluent, and the whole head affected. Where the disease is situated, the hair becomes lighter in its colour, it falls off, and its roots are destroyed. The porrigo scutulata generally occurs in children three or four years old and upwards, and frequently proves exceedingly obstinate. According to Dr. Bateman, it seems to originate spontaneously in children of feeble and flabby habit, and who are ill fed, uncleanly, and not sufficiently exercised; but he thinks that it is chiefly propagated by contagion, i. e. by the actual conveyance of the matter from the diseased to the healthy, as may happen in the frequent contact of the heads of children, the use of the same towels, combs, caps, and hats.

While the patches are inflamed and irritable, it is necessary to limit the local applications to washing the parts with warm water. Even shaving the scalp, which must be repeated at intervals of eight or ten days, produces a temporary irritation. Nothing but a light linen cap is now to be worn, and it must be often changed.

The disease afterward forms dry scabs, and becomes for a time less irritable; but a fresh eruption of achores soon follows, and the inflammation and redness return.

In the inflamed states, Dr. Bateman recommends the use of ointments, made either with the cocculus indicus, submuriate of mercury, oxide of zinc, superacetate of lead, opium, or tobacco; or else the infusion of poppy-heads, or tobacco. Where there is an acrimonious discharge, Dr. Bateman prescribes the zinc, or saturnine ointments, the ung. hydrarg. præcip. calomel ointment, or a lotion of lime-water and calomel.

In the less irritable stages, the ung. hydrarg. præcip. the ung. hydrarg. nitrico-oxydi, and especially the ung. hydrarg. nitrat. are often effectual remedies. So are the ointments of sulphur, tar, hellebore, and turpentine, and lotions of the sulphates of zinc and copper, the oxymuriate of mercury.

I have often seen a solution of ℥j of the sulphuret of potassa in a pint of lime-water, succeed when most other applications had failed. In the very dry and inert state of the patches, Dr. Bateman has seen the disease removed by a lotion, containing from three to six grains of the nitrate of silver in an ounce of distilled water. The application of the diluted mineral acids, or of a blister, has also been known to put a permanent stoppage to the morbid action.

In general, no local application agrees well, if long continued, and it is necessary to have several, which must be alternately employed.

The cure may often be expedited by cinchona, chalybeate, and alterative medicines; and attention must be paid to the patient's diet, exercise, &c.

5. *Porrigo decalvans* consists in bald patches, surrounded by hair which is as thick as usual. It is not known whether any eruption of minute achores actually precedes the detachment of the hair.

Dr. Bateman remarks, that if the scalp is regularly shaved, and some stimulating liniment be applied to it, this obstinate affection may at length be overcome, and the hair will regain its usual strength and colour. Two drams of oil of mace, in three or four ounces of alcohol, are said to make an excellent liniment.

6. *Porrigo favosa* consists of an irruption of the large, soft, straw-coloured flattened pustules, denominated *favi*, which may occur on any part of the body; but most commonly spread from the scalp, especially behind the ears, to the face, or from the lips and chin to the scalp. They are attended with considerable itching, and are most frequently seen in children from six months to four years of age, though adults are also often affected. The pustules pour out a viscid matter, which concretes into greenish or yellowish semi-transparent scabs. When the hair and moist scabs are matted together, pediculi are often generated in great numbers, and aggravate the itching and irritation. If the disease be allowed to increase, the scabs are thickened into irregular masses, not unlike honey-comb; and considerable ulcerations sometimes form, especially when the heel and toes, or other parts of the lower extremities, are affected. The ulcerating blotches are generally soon followed by irritation and swelling of the lymphatic glands, which sometimes slowly suppurate. The contact of the discharge inoculates the disease; thus, in young children, the breast is inoculated by the chin; and the arm and breast of the nurse may be infected in the same way; though adults do not take the complaint so quickly as children.

The porrigo favosa requires the same alteratives, internally, as the porrigo larvalis. The diet should consist of milk, puddings, and a little plain animal food. When the habit is bad, and the glands swelled, bark, chalybeates, and a solution of the muriate of barytes, are proper.

As local applications, Dr. Bateman prefers the unguentum zinci, or the ung. hydrarg. præcip. mixed with this or the saturnine ointment, especially when the discharge is copious. He also speaks favourably of the ung. hydrarg. nitrat. the strength of which is to be diminished by an addition of simple cerate, according to the degree of irritation present.

For the preceding particulars I am indebted to Dr. Bateman's valuable Synopsis of Cutaneous Diseases, where the reader, desirous of additional information respecting porrigo, will be amply gratified.

POTASSA ARSENICATA. *Kali Arsenicatum. Arsenias Kali.* ℞. Oxydi albi arsenici, potassæ nitratis sing. ℥j. Crucibulo amplo igne candenti injice nitrum, et liquefacto adde gradatim arsenicum in frustulis donec vapores nitrosi oriri cessaverint. Solve materiam in aquæ distillatæ ℔iv. et post idoneam evaporationem sepone ut fiant crystalli. These crystals may be given in the dose of one-tenth of a grain, thrice a day. (*Pharm. Sancti Barthol.* 1799.) Justamond strongly recommended the internal exhibition of arsenic in cases of cancer. (See *Cancer.*)

POTASSÆ CARBONAS. Two drams of this medicine have been given, as a lithontriptic, at St. Bartholomew's Hospital, in a pint of distilled water, twice a day.

POTASSA FUSA. *Caustic Potash.* This is one of the most useful caustics for destroying fungi, making issues in cases of diseased vertebræ, white swellings, &c.; and it is recommended to be used in a particular manner, by Mr. Whately, for the cure of strictures in the urethra. When surgeons prefer opening buboes, or any other abscesses, with caustic, the caustic potassa is very commonly employed. When surgeons used to cure hydroceles, by destroying a part of the scrotum and tunica vaginalis with caustic, the potassa fusa, either alone or mixed with quicklime, was made use of. (See *Vertebræ, Urethra, Strictures of, &c.*)

POTASSÆ SULPHURETUM. *Sulphuret of Potash, Liver of Sulphur.* Two drams, dissolved in a pint of lime or distilled water, make an excellent lotion for the cure of porrigo. Many other cutaneous affections yield also to the same remedy. When arsenic has been swallowed as a poison, twenty grains of the sulphate of zinc may be given as an emetic of the quickest operation; and, after keeping up the vomiting by drinking warm water, and, what is better, sweet oil, some authors recommend making the patient drink as much as possible of a solution of the sulphuret of potash.

PREGNANCY is set down by some writers as preventive of the union of broken bones; but many exceptions to the remark present themselves in practice; for I have attended myself a female, six months gone with child, who broke both bones of her leg, yet they grew together again in the usual time. (See *Fractures.*) Pregnant women also frequently bear operations much better than might be expected. Thus M. Nicod has recently published a successful amputation of the left leg during pregnancy, in a case where the right tendo Achillis was also ruptured. Both the wound, and the broken tendon, united very well. (See *Annuaire Méd. Chir. des Hôpitaux de Paris*, p. 509. 4to. *Paris*, 1819.)

PROBANG. A long slender bit of whalebone, with a bit of sponge at its extremity, intended for the examination of the œsophagus, or the removal of obstructions in it.

PROCIDE'NTIA. Prolapsus. A falling down of any part. (See *Anus, Prolapsus of. Uterus, Prolapsus of, &c.*)

***PROSTATE GLAND, DISEASES OF.** It is an observation, made by Mr. Hunter, that the use of this gland is not sufficiently known to enable us to judge of the bad consequences of its diseased state, abstracted from swelling. Its situation (says he) is such, that the bad effects of its being swelled must be evident, as it may be said to make a part of the canal of the urethra, and therefore, when it is so diseased that its shape and size are altered, it must obstruct the passage of the urine. (*On the Venereal Disease, p.* 169.) A swelling of the prostate gland, however, may be of very different kinds: thus it may depend either upon common inflammation of the part, abscesses, calculi formed within its substance, a varicose enlargement of its vessels, or a scirrhous, chronic induration. (See *Œuvres Chir. de Desault par Bichat, T.* 3, *p.* 220.)

Modern anatomists describe the prostate gland as not being itself a very sensible part, and hence it is more subject to chronic than acute disease, to which, however, it is also liable. We have the authority of Desault, Hunter, and Dr. Baillie, for setting it down as subject to scrofula. The latter physician, after stating that he has seen a common abscess situated in it, adds, that it is also subject to scrofulous disease, as, on cutting into it, he has met with the same white curdy matter which is formed in a scrofulous absorbent gland; he has likewise forced out of its duct scrofulous pus. (*Morbid Anatomy, &c.*)

Mr. Lloyd states, that he has also met with fleshy enlargements of the gland, in the substance of which several small abscesses were formed, containing "a complete scrofulous matter." He has also known enormous enlargements of this gland happen in young men who were labouring, at the same time, under other scrofulous disease. Other instances of supposed scrofulous swellings of the same part in young patients are likewise cited by this author, one of which is particularly remarkable, as in it the gland was found after death to be of the size of a child's head, though its natural consistence was not much changed. (*On the Nature and Treatment of Scrofula, p.* 107.) Other chronic, or as they are more often called, scirrhous enlargements of the prostate gland, rarely occur in subjects under the age of fifty. To these cases I shall presently return.

Like every other part of the body, the prostate gland is sometimes, but not often, the seat of common phlegmonous inflammation. Mr. Wilson has known two or three instances of this kind take place soon after puberty; one case was from a fall; the others arose without any assignable cause. (*On the Male Urinary and Genital Organs, p.* 327.) There is also a phlegmonous swelling of the prostate gland, sometimes an effect of strictures, as will be presently noticed. As Desault observes, the retention of urine, arising from such a cause, comes on very suddenly and rapidly increases. The patient at first complains of a sense of heat and weight about the perinæum; and, soon afterward, of a continual throbbing pain about the neck of the bladder. The pain is severely increased when the patient goes to stool; and there is tenesmus, and frequent inclination to make water. However, according to Mr. Wilson, the desire to evacuate the urine is here less constant than in cases where the inner membrane of the bladder is inflamed. (*Vol. cit. p.* 327.) The patient feels also as if a large mass of excrement filled the extremity of the rectum, and were ready to come out. If a finger be introduced within the rectum, the swelling of the gland is plainly distinguishable; and, according to J. L. Petit, the projection of the prostate gland in the bowel makes a corresponding hollow groove along the concave side of the excrement, as may be noticed, when what is voided is hard. However, Bichat conceives, that such an appearance must generally be obliterated as the excrement is passing through the sphincter. When the patient attempts to make water, it is a long while before the first drops come out, and as straining has the effect of propelling the swelled prostate more against the neck of the bladder, it only increases the difficulty, and no urine will come out until such efforts are discontinued. The more violent the inflammation is, the smaller is the stream of urine, and the more acute the pain felt during its expulsion. According to Desault, it is likewise particularly remarkable in such cases, that if an attempt be made to introduce a catheter, the instrument passes without the least resistance as far as the prostate gland, where it stops, and causes great pain. The pulse is hard and frequent; and the patient is exceedingly thirsty and feverish. Desault considered the retention of urine in cases of this kind, and, indeed, in all enlargements of the prostate gland, or other obstruction of the urethra, as generally more dangerous than other retentions, merely depending upon weakness of the bladder, where there is little risk of this organ giving way. When the urethra is free from obstruction, the urine, after distending the bladder in a certain degree, generally oozes through that canal, and the patient may live in this condition for years without any alarming symptoms. But the case is different when the retention of urine depends upon any stoppage or stricture in the urethra. The urine does not then partially escape, but stagnates in the bladder; the distention increases;

and if speedy relief be not afforded, a perilous extravasation follows. The danger, however, of such a retention of urine depends very much upon the extent and severity of the inflammation. However, this statement will not apply to the chronic scirrhous enlargement of the prostate, because, as will be presently explained, in this affection some of the urine begins to dribble away after the bladder has become distended in a certain degree.

In cases of phlegmonous inflammation of the prostate gland, antiphlogistic treatment is indicated; especially venesection, leeches to the perinæum and near the anus, the warm bath, emollient clysters, poultices, and fomentations, and a low regimen. However, as Desault admits, the efficacy of these means is often too slow, and the symptoms too urgent, to allow the surgeon to wait for the urine to flow of itself. Frequently, also, the distention has so weakened the bladder, that this organ cannot expel its contents; in which event the catheter must be used, though the diminished diameter and altered course of the prostatic portion of the urethra sometimes renders its introduction difficult, and always very painful. The practical observations respecting the best kind of catheters, and the mode of introducing them in cases of swelled prostate gland, will be more conveniently introduced when the chronic enlargement of this part is considered. (See also *Catheter* and *Urine, Retention of.*) In every instance of retention of urine from acute inflammation about the neck of the bladder, whether the case be an abscess forming near the anus, or a phlegmonous inflammation of the prostate gland, or other adjacent part, it has always appeared to me that antiphlogistic and anodyne remedies should first be fairly tried, and the catheter, which always increases the pain and irritation, only used where such means do not afford relief with sufficient expedition.

When a catheter has been introduced, ought it to be left in the bladder, or withdrawn, after the discharge of the urine? Its presence no doubt will increase the irritation about the neck of the bladder; but on the other hand, if it be taken out, the surgeon may not be able to introduce it again. No general precept, says Desault, can be laid down on this point. The course which the practitioner will pursue, must depend upon the difficulty he has experienced in getting the instrument into the bladder, and upon the confidence which he may have in his own skill, and which must be founded upon constant success in analogous instances.

According to Desault, when an abscess follows inflammation of the prostate, the body of the gland itself does not suppurate, but only the surrounding parts, and the cellular substance, which connects its lobes together. This, at least, was what was observed in examining several dead subjects, who were publicly opened in the amphitheatre of the Hotel-Dieu.

When the symptoms of inflammation have lasted a week, and all this time have continued to increase; when, after this period, they have abated a little, and then become violent again; and when the febrile symptoms grow worse in the evening, and have been preceded by shiverings; there is reason to suspect the formation of matter. It cannot be known, whether the pus is collected in one particular place, or diffused. When the matter is external to the gland, the case is less serious than when it occupies the cellular substance connecting the lobes. According to Desault, the latter form of the disease seldom gets well. There are no peculiar symptoms which denote it; the matter does not readily make its way outward; and the state of things is not clear enough to admit of an incision being made. Besides, Desault doubted whether an incision could be of much use, since it would probably only discharge the manner in its vicinity.

Things are different when the pus is collected in one place, and is more superficial. If situated between the gland and neck of the bladder, Desault says, it will often spontaneously burst into this viscus, or it may be let out with the point of the catheter. It will then either be discharged through the instrument, or come away with the urine. However, according to Mr. Wilson, abscesses of the prostate gland generally burst into the urethra behind the caput gallinaginis, but sometimes before it; and he has seen more than one instance, in which they have burst in the perinæum. (*On the Male Urinary and Genital Organs, p.* 329.) Should the abscess lie near the rectum and perinæum, and admit of being distinctly felt, Desault conceived, that a free opening would expedite the cure.

In all these cases, the use of the catheter is requisite, in order to let out the urine, and as the instrument must be left in the passage some time, Desault preferred one made of elastic gum. As Mr. Wilson has remarked, soothing means should also be employed; internal narcotic medicines, anodyne clysters, the mixtura amygdalarum, &c.

Morgagni has taken notice of the retentions of urine, arising from the presence of calculi in the prostate gland. The nature of these concretions will be described in the article *Urinary Calculi.* Calculi also sometimes form in or about the prostate gland, when, after lithotomy, the outer part of the wound heals sooner than the bottom. A kind of urinary fistula then ensues; and as the extraneous substance is constantly exposed to the contact of fresh urine, it may increase to a very large size. The diagnosis of prostatic calculi is seldom very clear. A retention of urine, and an impediment to the emission of the semen, are said to be the only symptoms, and these are common to several other affections of the prostate gland and urethra. When the finger is introduced into the rectum, the gland may indeed be felt to be enlarged; but the nature and cause of such enlargement cannot in general be distinguished. In one instance, however, lately recorded by Dr. Marcet, the calculi could be plainly felt through the coats of the rectum, and a proposal was made to extract them by an incision in that situation; but the patient did not accede to so judicious a measure. (*Med. and Chym. Hist. of Calculous Disorders*, 8vo. 1817.) When a calculus projects from the prostate gland into the urethra, the end of a sound will strike against it; but then it can rarely be known whether the extraneous substance may not be a calculus that has passed out of the bladder into the urethra, or lies close to the neck of this viscus.

Whether the case be of one description or the other, however, the treatment should be the same; viz. the calculus should be extracted by an incision, resembling that practised in the lateral operation.

A considerable varicose affection of the vessels of the prostate gland, which is also itself generally somewhat enlarged, is another disease, treated of by writers as one cause of a retention of urine. In this case the water should be drawn off with an elastic gum-catheter, which should be kept in the urethra; and a large instrument is to be preferred to a smaller one. For an account of the symptoms of this case, I must refer to *Les Œuvres Chir. de Desault, T. 3, p.* 234. The practice of this author was gradually to dilate the portion of the urethra which passes through the prostate, with bougies, or elastic catheters, which were worn a long while, and cleaned and changed at proper intervals. I am not aware, that these cases are recognized in the practice of surgery in England.

The most frequent disease of the prostate gland, and, of course, that which is most interesting to the practical surgeon, is a slow hardening and enlargement of it, sometimes denominated *scirrhus*, whereby its natural size, which is that of a common chesnut, is sometimes gradually changed to that of a man's fist. (*J. L. Petit.*) According to the observations of Mr. Hunter, Desault, and Sir Everard Home, this chronic swelling of the prostate gland is most common in the decline of life; one circumstance in which it differs from scrofulous diseases of the same part, which are well known to happen chiefly in youngish persons. It is observed by Mr. Hunter, that when the prostate gland swells, "it does not lessen the surface of the urethra at the part, like a stricture; on the contrary, it rather increases it; but *the sides of the canal are compressed together, producing an obstruction to the passage of the urine, which irritates the bladder, and brings on all the symptoms in that viscus, usually arising from a stricture, or stone.* From the situation of the gland, which is principally on the two sides of the canal, and but little, if at all, on the fore-part, as also very little on the posterior side, it can only swell laterally, whereby it presses the two sides of the canal together, and, at the same time, stretches it from the anterior edge, or side, to the posterior, so that *the canal*, instead of being round, *is flattened into a narrow groove, sometimes the gland swells more on one side than the other, which makes an obliquity in the canal passing through it.*

"Besides this effect of the lateral parts swelling, *a small portion of it which lies behind the very beginning of the urethra*, swells forwards, like a point, as it were, into the bladder, *acting like a valve to the mouth of the urethra*, which can be seen even when the swelling is not considerable, by looking upon the mouth of the urethra from the cavity of the bladder in a dead body. *It sometimes increases so much as to form a tumour, projecting into the bladder some inches.* This projection *turns*, or *bends the urethra forwards, becoming an obstruction to the passage of a catheter, bougie, or any such instrument; and it often raises the sound over a small stone in the bladder, so as to prevent its being felt.*" (*Hunter on the Venereal Disease, p.* 169.) The valvular production just behind the beginning of the urethra, here described, particularly merits attention, because it is represented by Sir Everard Home as arising from the enlargement of what he considers a newly discovered part in anatomy, viz. a *third*, or *middle lobe* of the prostate gland. (See *Phil. Trans.* 1806.) In the dissections, which Sir Everard mentions, as having led to this discovery, "the urinary bladder was distended with water, and the surfaces of the prostate gland, vesiculæ seminales, and vasa deferentia, were fairly exposed. This being done, the vasa deferentia and vesiculæ seminales were carefully dissected off from the bladder, without removing any other part. These were turned down upon the body of the prostate gland. An accurate dissection was then made of the circumference of the two posterior portions of the prostate gland, and the space between them was particularly examined. In doing this, *a small* rounded substance was discovered, so much detached that it seemed a distinct gland, and so nearly resembling Cowper's glands in size and shape, as they appeared in the same subject, in which they were unusually large, that it appeared to be a gland of that kind. It could not, however, be satisfactorily separated from the prostate gland, nor could any distinct duct be found leading into the bladder.

"A similar examination was made of this part in five different subjects. The appearance was not exactly the same in any two of them. *In one, there was no apparent glandular substance, but a mass of condensed cellular membrane*: this, however, on being cut into, differed from the surrounding fat. In another there was a lobe, blended laterally with the sides of the prostate gland. These facts (says Sir Edward Home) are mentioned in proof of its not being always of the same size, or having exactly the same appearance."

This is found also to be the case with

Cowper's glands: they are sometimes large and distinct; in other subjects, they are scarcely to be detected; and, in others again, are in all the intermediate states. The most distinct and natural appearance of this part was in a healthy subject, twenty-five years of age, of which the following is an account. On turning off the vasa deferentia and vesiculæ seminales, exactly in the middle of the sulcus, between the two lateral portions of the prostate gland, there was a rounded prominent body, the base of which adhered to the coats of the bladder. It was imbedded, not only between the vasa deferentia and the bladder, but also, in some measure, between the lateral portions of the prostate gland and the bladder, since they were in part spread over it, so as to prevent its circumference from being seen, and they adhered so closely as to require dissection to remove them; nor could this be done, beyond a certain extent, after which the same substance was continued from one to the other. This proved it to be a lobe of the prostate gland; its middle had a rounded form, united to the gland at the base next the bladder, but rendered a separate lobe by two fissures on its opposite surface. Its ducts passed directly through the coats of the bladder, on which it lay, and opened immediately behind the verumontanum. By means of this lobe, a circular aperture is formed in the prostate gland, which gives passage to the vasa deferentia. "Previous to this investigation (says Sir Everard) it was not known to me, that any distinct portion of the prostate gland was situated between the vasa deferentia and the bladder." (*On Diseases of the Prostate Gland*, p. 9, 8vo. *Lond.* 1811.) Notwithstanding this explanation, to the correctness of which most English anatomists have acceded, it is worthy of notice, that Langenbeck, the present distinguished Professor of Anatomy and Surgery at Göttingen, in a review of Sir Everard's account, declares, that he has never, *in the natural state of the parts*, found the middle lobe, as it is called, which he considers as a partial induration, rising up in the shape of a lobe. (*Neue Bibl. B.* 1, *p.* 360, 12*mo. Hanover*, 1818.) This dissent would seem extraordinary, if it were not possible to suppose, that it may proceed, not from all the subjects at Göttingen differing from Londoners in being destitute of, what Sir Everard Home has named, the *middle lobe of the prostate gland*, but from Langenbeck's not having traced *in the healthy state of the gland*, any portion which *he thought* deserving of that name. But though differences of opinion may be entertained about the name, none I presume can remain about the thing itself, which appears to have been long ago mentioned, though not perfectly described, by Morgagni. (*Adversaria Anat.* 4, *Animad.* 15.) The paper by Mr. C. Bell, illustrating how far our predecessors had a knowledge of this portion of the gland, seems to me one of his best productions; and it is therefore with pleasure that I refer to it. (See *An Account of the Muscles of the Ureters in Med. Chir. Trans. Vol.* 3, *p.* 171, *&c.*) However, as this author impartially acknowledges, it is not because a fact was anciently known, or perhaps only cursorily noticed, that there may not be great merit in reviving the recollection, or perfecting the description of it; and as far as I can learn, none of the anatomical teachers in this city, previously to Sir Everard's paper, particularly adverted, in the healthy original state of the prostate gland, to the structure, which he has pointed out, by whatever name it be distinguished.

According to Sir Everard Home, this lobe, in the earlier periods of life, when the body of the gland is in a sound state, is small; nor does it appear to become enlarged, even when the body and the lateral lobes have been considerably increased in size; but, in subjects of advanced age, this part, as well as the rest of the gland, is usually found somewhat enlarged, even in cases where no disease has been suspected during life. (*P.* 17.) When the middle lobe begins to enlarge, it presses inwards towards the cavity of the bladder, putting the internal membrane upon the stretch, and communicating to it by immediate contact the inflammation, which occasioned its own enlargement. Hence, pain in making water, particularly after the last drops are voided, and a desire and straining to discharge more, after the bladder is empty.

As this organ cannot now retain much urine, the desire to make water becomes frequent, and there is commonly more or less constitutional disturbance, or symptomatic fever. According to Sir Everard Home, in proportion as the middle lobe increases in size, it projects into the cavity of the bladder in the form of a nipple; but after a further augmentation, it loses the nipple-like appearance, becomes broader, and forms a transverse fold by pushing forward, and stretching, the membrane, connecting it to the lateral lobes. "*As the tumour, and the transverse fold, are situated immediately behind the orifice of the urethra, they are pushed forwards before the urine in every attempt that is made to void it, acting like a valve, and closing up the opening, till the cavity of the bladder is very much distended, when the anterior part of the bladder being pushed forward, and the tumour being drawn back, in consequence of the membrane of the posterior part of the bladder being put on the stretch, the valve is opened, so that a certain quantity of water is allowed to escape, but the bladder is not completely emptied.* (*P.* 19.) Sir Everard Home afterward explains, that, as the tumour enlarges, the quantity voided at each time becomes smaller, and that which is retained is increased, until at length, the disease becomes so much aggravated, that there is a complete retention of urine. The body of the gland, and the lateral lobes, though less disturbed than the middle lobe by the patient's repeated efforts to void the urine, become more or less enlarged; but it is remarked, that they do not preserve either their natural, or any regular, proportion, to the middle lobe, nor do they always swell equally together, the left in some instances becoming much larger than the right. (*P.* 22.) When Sir Everard Home published his first vol. on diseases of the prostate gland, he had seen only the left lobe form the greatest projection within the bladder; but, in his second vol. published in 1818, there is an engraving, representing the right lobe thus altered; and he mentions two instances, in which a similar enlargement of the same lobe had taken place. Mr. Wilson has also more than once met with this greater swelling of the right lobe. (*On the Male Urinary and Genital Organs, p.* 336.) The recollection of these facts will often enable the practitioner to incline the beak of a catheter in the direction by which it may be conducted into the bladder, and thus, as Sir Everard Home has remarked, the surgeon, after trying gently on the left side, and not succeeding, is not to persevere in that direction, but try whether the passage will offer less resistance on the opposite side.

The diseased state of the body of the prostate gland, and of the lateral lobes, here alluded to by Sir Everard Home, he says, is very different from that, which is met with in the earlier periods of life, in consequence of strictures of the urethra, and which subsides when the obstruction in that canal is removed. This enlargement of the prostate gland from strictures, he observes, may not be unaptly compared to the swelling of the testicle in gonorrhœa, a case of accidental inflammation in a healthy testicle; while the other disease of the prostate is analogous to the more permanent disease of the latter organ. This author adverts, however, to a few instances, in which the enlargement of the body of the prostate gland from strictures, in persons 50 years of age, did not subside immediately the latter affection was cured, a common bougie stopping at the neck of the bladder, although a catheter, which had a regular curve, readily passed. According to Sir Everard Home, as in such cases, the patients were able to empty their bladders, it is evident, that there could be no enlargement of the middle lobe. In cases like these, no symptom of importance is produced, and, whether the swelling of the prostate readily subsides, or not, is of no consequence; though, if the stricture do not return, it will always ultimately diminish. (*On Diseases of the Prostate Gland, Vol.* 1, *p.* 24.) In patients under 50 years of age, Sir Everard Home has rarely found the middle lobe so swelled as to produce retention of the urine, or an inability to empty the bladder, notwithstanding the rest of the gland might be much enlarged. (*P.* 23.) When the middle, and one of the lateral lobes, project considerably into the bladder together, their surface is sometimes excoriated, and has an ulcerated appearance. Under such circumstances, the pain, after voiding the last drops of urine, is said to be very severe, and attended with spasmodic affections of the neck of the bladder, of the most distressing kind.

According to Sir Everard Home, another effect of a similar enlargement of the prostate gland is to render its secretion extremely viscid and very abundant. A question might arise about the real source of this ropy mucus, and some might infer, that it was secreted by the bladder; but that it comes entirely from the inflamed prostate gland is proved, says this gentleman, by its having been found in one instance with one extremity floating in the bladder in the dead body, while the other extremity appeared divided into small filaments, terminating in the orifices of the excretory ducts of the gland at the verumontanum. The quantity of secretion is observed to depend more upon the degree of irritation, than the actual enlargement of the gland, and, as this increased secretion happens in cases of swelling of this part from strictures, where the body and lateral lobes are alone affected, it is inferred, that the disease of the middle lobe only contributes to this effect by keeping up a straining, and disturbance of every part of the gland. (*P.* 32.) The internal membrane of the bladder inflames, and becomes extremely irritable, so that, even when the quantity of urine is small, there is a great deal of straining. When the size and form of the tumour are such as to allow the greater part of the urine to pass, though with great effort, Sir Everard states, that the symptoms may continue nearly the same for months; liable, however, to occasional aggravations from slight causes, and becoming more or less relieved, when these are removed. Nay, he observes, that the symptoms may even lessen, although the disease is not at all diminished; a circumstance, which is ascribed to the muscular coats of the bladder having acquired greater strength, and the internal membrane having lost, from habit, the sensibility, which it possessed in the earlier stage. (*P.* 34.) He further explains, that, in this disease, when the inside of the bladder is inflamed, filamentous portions of coagulating lymph are thrown off from it, which, when the inflammation increases, subside in the urine evacuated, looking not unlike white hair-powder; and, when the irritation is very violent, perfectly formed pus is met with in the urine. (*P.* 35.) After the inflammation subsides, the bladder becomes again capable of retaining a larger quantity of urine, though its power of completely emptying itself is still further diminished.

According to Mr. Wilson, the symptoms, which generally attend an enlarged prostate gland, are similar to those of an irritable bladder:—constant, heavy, dull pain in the gland, and sometimes sharp lancinating pains, darting from it to the urethra, and occasionally to the bladder and ureters. Frequent calls to void the urine, which is passed with difficulty, only a small quantity being discharged at a time, as more or less always remains behind in the bladder. A complete retention of urine may be produced, so that not one drop will pass, although much straining is used. Great difficulty in expelling the feces, and after each evacuation, a feeling is still experienced, as if the gut were not yet emptied. During the efforts to expel the urine and feces, a quantity of the mucous secretion of the prostate gland is not unfrequently forced out. Most of these symptoms, as Mr. Wilson observes, are similar to those produced by stone, and, therefore, when they occur, the gland should be examined by the rectum, and, if it be not found diseased, a sound should be introduced into the bladder. (*On the Male Urinary and Genital Organs, p.* 339.) The particular differences, between the symptoms of stone, and those arising from disease of the prostate gland, are explained in the article *Lithotomy.*

Mr. Hunter first pointed out a fact, which the practical surgeon should never forget, viz. that the swelling of what is now called the middle lobe of the prostate gland, often raises the sound over a small stone in the bladder, and prevents it from being felt. (*On the Venereal Disease, p.* 170.) Hunter also first noticed another circumstance well deserving recollection, viz. that an enlargement of the same part may account for the disappearance of all the symptoms of stone in patients who have already suffered greatly from them, as the swelling prevents the calculi from falling down upon, and irritating the neck of the bladder. These truths are exemplified by cases which are highly interesting. It appears also probable, from the observations of Sir Everard Home, that an enlargement of the middle lobe conduces to the formation and lodgment of calculi in the bladder, partly by preventing the evacuation of small ones through the urethra, and partly by hindering the bladder from completely discharging its contents. (*Vol.* 1, *p.* 40.) Lastly, it is explained, that in disease of the prostate gland, patients secrete less urine than natural, and that death is sometimes produced by the retention of urine suppressing such secretion altogether. In cases of enlargement of the middle lobe, one symptom, on which Sir Everard Home lays great stress, is hemorrhage produced by riding on horseback. (*Vol.* 2, *p.* 27.) Inflammation and even ulceration of the membrane covering the middle lobe, he says, are more frequent than he was at first aware of, and are produced by the rough introduction of instruments. Hence, the burning heat at the neck of the bladder, the great pain and distress attending the passage and the continuance of an instrument, the occasional necessity of taking it out, and the duration of the pain for some time afterward. (*Vol. cit. p.* 29.)

According to Mr. Wilson, in a case of what is named scirrhous prostate gland, the enlargement at first takes place slowly, attended with pain, and no particular alteration of the structure is apparent in the gland, when examined in this stage after death, nor is any change discoverable when the part is felt from the rectum in the living patient. As the disease proceeds, the structure of the whole gland changes, and the part enlarges, sometimes regularly so as to preserve its shape, to the size of a moderate orange; sometimes very irregularly, projecting in a lobulated manner. When the gland in this state is cut into, its substance feels firm, the cut surface is of a whitish brown colour, and the membranous septa, extending through it in various directions, are often very strongly marked. In general, before the urethra and bladder are opened, the gland appears most enlarged laterally. It also swells backwards towards the rectum, producing that appearance of the excrement particularly noticed by J. L. Petit, and already mentioned in speaking of common inflammation of the gland. Mr. Wilson further states, that its anterior part is generally least enlarged, because its connexion with the pubes prevents it from passing far forward. However, this gentleman has seen some instances, in which the enlargement above, or in front of the urethra, was considerable. The extent of the lateral and posterior swelling may be readily felt with the finger, introduced within the rectum. That these very irregular windings in the prostatic portion of the urethra are frequently occasioned by the disease, is also confirmed by Mr. Wilson's experience, and numerous preparations in the Museum of the College of Surgeons. "In the progress of the enlargement, the two sides do not always swell equally; one often enlarges most, and often swells more in one particular part than another. This produces a lateral bend, or obliquity in the passage, which will of course increase the difficulty of passing the urine, and of introducing the catheter. I have seen from the irregularity of the lateral swelling, the passage through the gland bend in succession to both sides." (*J. Wilson on the Male Urinary and Genital Organs, p.* 332, 335.)

As every considerable enlargement of the prostate gland is attended with great difficulty of voiding the urine, the muscular coat of the bladder always becomes more or less thickened, in consequence of the efforts which it is obliged to make.

In relation to the third, or middle lobe, it is to be observed, that from some dissections made by Mr. Shaw, it would appear, that in many cases the enlarged portion of the prostate, projecting into the bladder, is not the third lobe, but a part of the gland situated more forwards. (See *Bell's Surgical Obs. Vol.* 1, *p.* 223, *&c.*)

According to Sir Everard Home, a stricture may be distinguished from an enlargement of the prostate gland, by the following circumstances: the distance of the obstruction from the external orifice is to be determined by passing a soft bougie, which is to be left in the canal for a minute, so as to receive an impression from the obstruction. If the bougie does not pass further than seven inches, and the end is marked by an orifice of a circular form, (it is immaterial as to the size of the orifice,) the disease is certainly a stricture; but if it passes further on, and the end is blunted, a disease in the prostate gland is to be suspected. This in general may be ascertained by the possibility of passing into the bladder a flexible gum-catheter with a stilet, very much curved, which in most cases of enlargement of the gland may be accomplished.

On the subject of the causes of a scirrhous enlargement of the prostate gland, it appears to me, that little certain is known, excepting that it is a disease seldom met with under the age of fifty. Desault suspected, that it was sometimes venereal, and common in individuals who had repeatedly had gonorrhœa. (*Traité des Mal. Chir. T.* 3, *p.* 238.) I believe neither of these sentiments is entertained by the best surgeons of the present day. According to Sir Everard Home, it is a rare occurrence for a man to arrive at 80 years of age, without suffering more or less under disease of this part. "The more common causes (says he) of inflammation of the prostate gland, are full living of every kind, inebriety, indulgence to excess with women, a confined state of the bowels, and exposure to the effects of cold; indeed, whatever increases the circulation of the blood in these parts (the genitals I suppose) beyond the healthy standard, may become a cause of inflammation in this gland, the blood-vessels of which lose their tone in the latter periods of life." (*On Diseases of the Prostate Gland, Vol.* 1, *p.* 18, 19.) If we are to credit another statement, the disease occurs most frequently either in persons who have not used the genital organs so much as nature intended, or in others who have led a life of excess. (*Wilson on the Urinary and Genital Organs, p.* 332.) It seems to me better to confess, that the etiology of this complaint is unknown. Nor are we rendered much wiser by conjectures about the effects of horse exercise, or those of a retarded venous circulation in old subjects, in creating a tendency to the disease. I have known several persons afflicted, who had led very sedentary lives.

I am afraid, that the observation formerly made by Mr. Hunter still continues true, which is, that a certain cure for the scirrhous enlargement of the prostate gland is not yet discovered. But though such is the fact, surgery is undoubtedly capable of affording a great deal of relief, so as to lengthen the patient's days, and render them much more comfortable. This is accomplished principally by anodyne medicines, and drawing off the patient's water, when he cannot void it himself either at all, or but imperfectly, and with considerable straining and suffering. As a temporary relief from pain, and also as a means of removing spasm, opiate clysters should be administered once or twice a day. (*Hunter, p.* 174.) Scrofulous enlargements of the prostate gland, occurring in younger subjects, are probably more under the control of judicious treatment. Thus, Mr. Hunter informs us, that in several cases he had seen hemlock of service. "It was given upon a supposition of a scrofulous habit. On the same principle, (he adds,) I have recommended sea-bathing; and have seen considerable advantages from it, and in two cases, a cure of some standing." In one case, burnt sponge had reduced the swelling; and in another the same effect was produced, and the irritability of the bladder lessened, by means of a seton in the perinæum. After the healing of the seton, however, the symptoms returned, and on a trial of the plan again, the former good effects were not experienced from it. Some time ago, I attended a gentleman under Mr. Lawrence, who was trying the effect of an issue in the same situation; but I am not at present acquainted with the result. In these cases, the pilulæ hydrargyri cum conio (see *Pilulæ*) have been very commonly prescribed, as an eligible alterative. Sir Everard Home mentions an instance, in which suppositories of opium and hemlock, passed up the fundament, and allowed to dissolve there, gave more relief than any other plan, not only lessening the irritation, but producing a diminution of the projection of the gland.

In the first stage of the enlargement of the middle lobe, when there is no absolute obstruction to the passage of the urine, Sir Everard recommends bleeding from the loins, opiate clysters, and the pulv. ipecac. comp. (*On Diseases of the Prostate Gland, Vol.* 1, *p.* 70.) The tepid bath, the use of which he formerly advised, he now condemns as a practice "as little applicable to this disease, as putting the head in warm water would be to remove the symptoms of apoplexy; if any applications are to be made to the parts, they should be such as produce cold." (*Vol.* 2, *p.* 83.) In this stage, he observes, that catheters and bougies should on no account be introduced, more especially those of the metallic kind, since they produce a degree of disturbance which the parts are not in a state to bear, and if unskilfully employed, they will increase the swelling, and bring on a complete retention of urine. Sir Everard is an advocate for keeping the bowels open, for which purpose he prefers the infusion and tincture of senna, with the tartrate of potash. (*Vol.* 2, *p.* 84.) If, in defiance of these means, the patient becomes unable to make any water, or, although able to pass a few ounces, is every hour obliged to make the attempt, and after much straining, discharges only the same quantity, Sir Everard directs a flexible gum-catheter, without a stilet, to be passed into the bladder, in the gentlest manner possible. This instrument is to be kept introduced with the catheter bracelet, or retainer, made and sold by Mr. Weiss of the Strand, and the water drawn off at regular intervals, not only till the first symptoms go off, but till the bladder retain the urine for the usual length of time, and what is voided has the appearance of heathly urine. If, when the catheter is withdrawn, the patient should not be able to empty his bladder, it must be re-introduced, and after six or seven days, taken out again.

When the disease is somewhat more advanced, and the patient cannot keep himself quiet, the above practice of course cannot be adopted, and it becomes necessary to pass the catheter three or four times a day. But even under such circumstances, when irritation is brought on by accidental circumstances, Sir Everard recommends keeping the instrument in the bladder until the attack has subsided. (*Vol.* 2, *p.* 92, 96.) This gentleman finds that, for cases of diseased prostate gland, common flexible gum-catheters, originally made straight, are disadvantageous, as it is a long while before they can be made to keep a permanent curved form. "When (says he) the curvature of the catheter is no part of its original formation, although it may have been produced by being long kept in a curved state, yet, when allowed to remain in the bladder, it gradually returns to its straight form by being moistened, and when it has acquired it, the point is no longer kept directed upwards in the cavity of the bladder, but is constantly pressing against the posterior coats, pushing itself out of the urethra, and the irritation it gives the muscular coat of the bladder, will often be the means of its being expelled by a spasm with considerable violence." (*On Diseases of the Prostate Gland, Vol.* 2, *Chap.* 5.) Sir Everard further informs us, that Mr. Weiss, No. 33, in the Strand, has at length succeeded in making flexible gum-catheters, originally curved, so that they always retain their shape. Their polish is great, and they can be had of any size: they are also made particularly strong, a quality necessary to secure them from being broken in violent attacks of spasm. Sir Everard states, that he has kept them fifteen days in the bladder, without their being spoiled by the urine, or mucus; whereas, common French and English catheters become in a shorter period so rough as to be unfit for further use. Metal catheters, he asserts, should never be employed but in cases of necessity, where the patient cannot be relieved by milder means. (*Vol.* 2, *p.* 87.) To such instruments, he ascribes the frequently noticed ulceration of the middle lobe, the abrasion of its surface, the wounds through its substance, the general inflammation of the whole internal membrane of the bladder, and quick destruction of the patient's life. The gum catheter, however, is to be as large as the urethra will easily admit, in order that it may more readily disengage itself at the turns into the bladder. (*Vol.* 1, *p.* 75.)

According to Desault, a large catheter generally answers better than a small one, and it may either be of silver, or elastic gum. The latter, though the best for the purpose of being kept in the passage, he says, has not always sufficient firmness to get through the obstruction in the canal, not even with the aid of a stilet. In this respect, a silver catheter is sometimes preferable. But whatever may be the kind of catheter employed, it generally passes as far as the prostate with perfect facility, where it is stopped, not only by the narrowness, but also by the new curvature of the passage. For the prostate cannot be enlarged, without pushing forward and upwards, or to one side, that portion of the urethra behind which it is situated. This circumstance ought never to be forgotten, in regulating the length and direction of the beak of the catheter, which should also be longer, have a more considerable curvature, and be more elevated, at the time of its introduction, than in other cases of obstruction in the urethra.

In swellings of the prostate gland, Mr. Hey has particularly pointed out one advantage, which belongs to elastic catheters, viz. that their curvature may be increased while they are in the urethra. This gentleman was introducing an elastic gum-catheter in a patient, whose prostate gland was much enlarged, and finding some obstruction near the neck of the bladder, he withdrew the stilet, in doing which he accidentally repressed the tube, which then went into the bladder. In fact, he found that the act of withdrawing the stilet increases the curvature, and lifts up the point of the catheter. (*Pract. Obs. in Surgery, p.* 399, *Edit.* 2.) For further remarks connected with this subject, see the articles *Cathether*, and *Urine, Retention of.* Sir Everard Home states with confidence, that if the symptoms of the foregoing disease be prevented in their early stage from increasing by the treatment which he has recommended, the disease will get well. (See *J. Hunter's Treatise on the Venereal Disease, p.* 169, *&c.* 2*d Ed.* 4*to. Lond.* 1788. *Baillie's Morbid Anatomy. P. J. Desault, Œuvres Chir. T.* 3, *p.* 220, *&c.* 8*vo. Paris,* 1803. *Sir Everard Home, On the Treatment of Diseases of the Prostate Gland,* 2 *Vols.* 8*vo. Lond.* 1811—1818. *Also, On Strictures,* 3 *Vols.* 8*vo.* 3*d Edit.* 1805—1821. *C. Bell, On the Muscles of the Ureters in Med. Chir. Trans. Vol.* 3. *J. Shaw, On the Structure of the Prostate Gland, in C. Bell's Surgical Obs. Vol.* 1, 8*vo.* 1816. *E. A. Lloyd on Scrofula, p.* 107, *&c.* 8*vo. Lond.* 1821. *J. Howship, Pract. Obs. on Diseases of the Urinary Organs, &c.* 8*vo. Lond.* 1816. *J. Wilson, On the Male Urinary and Genital Organs,* 8*vo. Lond.* 1821.)

PSEUDOSYPHILIS. (from ψευδης, false, and *Syphilis*, the venereal disease.) Disease resembling the venereal, but not really of this nature. The spurious venereal disease. (See *Venereal Disease.*)

PSOAS ABSCESS. (See *Lumbar Abscess.*)

PSORIASIS. *Scaly tetter.* A disease of the order Squamæ, in Dr. Bateman's Synopsis. It is attended with more or less roughness and scaliness of the cuticle, with a subjacent redness. The skin is often divided by deep fissures; and the complaint is generally attended with constitutional disorder, and liable to cease and return at certain seasons. For a particular account of its varieties and treatment, see the above work.

PSOROPHTHALMY. (from ψωρα, the itch, and οφθαλμια, an inflammation of the eye.) An inflammation of the eyelids, attended with ulcerations, which itch very much. Beer actually understands by the expression, such a disease, from the sudden repression of the itch, or the infection of those parts with psoric matter. (*Lehre von den Augenkr. B.* 1, *p.* 566.) Weller not only adopts the same notion, but makes an addition to it, by extending the term also to cases, in which the eyelids are affected with psoriasis, porrigo, and impetigines. (*Manual of the Diseases of the Eye. Vol.* 2, *p.* 264.) By psorophthalmy, the late Mr. Ware meant a case, in which the inflammation of the eyelids is attended with an ulceration of their edges, upon which a glutinous matter lodges, incrusts, and becomes hard, so that, in sleep, when they have been long in contact, they become so adherent, that they cannot be separated without pain. He has remarked, that "the ulceration in the psorophthalmy is usually confined to the edges of the eyelids; but sometimes it is seen to extend over their whole external surface, and even to excoriate the greater part of the cheek. In cases of the latter kind, the inflammation which accompanies, has often much the appearance of an erysipelas, and will receive most relief from the cooling applications. The use of the citrine ointment, which will hereafter be recommended, must in such instances, be deferred until the irritability of the skin is in a good degree abated.

"This disorder is also sometimes attended with a contraction of the skin of the lower eyelid; in consequence of which that lid is drawn down, and the inner part turned outward, so as to form a red, fleshy, and most disagreeable appearance, called ectropium. Whenever this happens, it proves the complaint to be of the most obstinate nature; though it is generally removed by the cure of the psorophthalmy, which is the occasion of it." (*Remarks on Ophthalmy, &c. p.* 112.) Mr. Ware recommended, for the cure of this disease, the unguentum hydrargyri nitrati. This is to be melted into an oil, and rubbed with the end of the fore-finger, or the point of a small pencil-brush, into the edges of the affected eyelids, once every night, on going to bed. A plaster of ceratum album is then put over the eyelids to keep them from adhering together. If they should still adhere in the morning, they are to be cleaned with milk and butter, well mixed together. In a few cases, it is necessary to touch the ulcers, formed on the edge of the eyelid, after the small-pox, with the argentum nitratum. When the globe of the eye is inflamed, the vinous tincture of opium is applied, as directed in the article *Ophthalmy.* In scrofulous subjects, alterative medicines; an issue, or perpetual blister; and attention to diet, &c. are proper. (See *Ware on Ophthalmy, &c.*)

In the treatment of psorophthalmy, Beer lays considerable stress upon the necessity of cleanliness. The itchy places he directs to be frequently washed with a tepid infusion of scordium, and afterward well dried. When the uneasiness and tension of the skin are thus quite removed, Beer adds to the preceding infusion some of the sulphuret of potash, the proportion being at first small, and gradually increased. This plan is to be followed, until the ulcerations dry and the scabs fall off of themselves, leaving the subjacent skin yet red and sensible, and sometimes moist; in this state, a small bit of the annexed salve may be smeared with a camel-hair pencil along the edges of the eyelids, and upon the affected points of the skin: ℞. Butyri recentis insulsi, ℥ss. Cupri Sulphatis, gr. x. Camphoræ, gr. iv. Tutiæ ptt. gr. vj. Misce. If the disease prove obstinate, Beer recommends Hufeland's salve, which consists of equal parts of fresh butter, yellow wax, and the pulv. hydrarg. nitrico-oxydi rubr.; and, in still more inveterate cases, Janin's eye salve, which, he says, must rarely be used oftener, than every other day. In the psorophthalmy, conjectured by Beer to depend upon the sudden cure of the itch, he states, that internal medicines are necessary, as antimonials, joined with sulphur and camphor. He also praises sulphur baths, and irritating the part of the skin where the itch has receded, by the application of antimonial ointment; or, if such part should be very far from the eyes, he advises such ointment to be rubbed on the skin behind the ears. Attention to diet is particularly enjoined, and eating pork, lard, and substances difficult of digestion, is prohibited. (*B.* 1. *p.* 569, *&c.*)

PTERYGIUM. (dim. of ϖτερυξ, a wing.) As Scarpa remarks, surgeons usually apply the term "*pterygium*" to that preternatural, reddish, ash-coloured, triangular little membrane, which most frequently grows from the internal angle of the eye, near the caruncula lachrymalis. and gradually extends over the cornea, so as to cause considerable impediment to vision.

The disease, however, presents itself sometimes in the form of a semitransparent thin grayish membrane, not furnished with many visible vessels; and sometimes as a thick, red, fibrous mass, very like muscle, being very prominent even on the cornea, where it seems to terminate in a substance like tendon, and it is observed to be pervaded by numerous blood-vessels. The first is the *pterygium tenue* of Beer; the second the *pterygium crassum* (*Lehre von den Augenkr. B.* 2, *p.* 636.) or, the membranous and fleshy pterygia of other writers.

Though the pterygium most commonly proceeds from the internal angle, (*also Beer, B.* 2, *p.* 637.) it is observed to arise sometimes from the external one, and, in some instances, from the superior or inferior hemisphere of the eyeball. But, whatever be its origin, its figure is invariably that of a triangle, with its base on the white of the eye, and its apex more or less advanced over the cornea, towards its centre, and that of the pupil. Indeed, there are a few cases in which two or three pterygia of different sizes occur on the same eye, and are arranged round its circumference at interspaces of various breadths. Their points are directed towards the centre of the cornea, and if they should unfortunately conjoin there, the whole of that transparent membrane becomes covered with an opaque veil, and a total loss of sight is the consequence. It seems to Scarpa, that the term "*pannus*" was applied by the ancients to exactly this sort of complication. However, the occurrence of more than one pterygium on the same eye is uncommon, as may be inferred from the experienced Beer having met with but two cases of a double pterygium, and with only one instance of three pterygia on the eye. (*B.* 2, *p.* 638.)

According to Scarpa, (whose observations apply chiefly to the membranous form of the disease) chronic varicous ophthalmy, with relaxation, and thickening of the conjunctiva; opacity of the cornea; and the pterygium; only differ in the degree of the disease. In reality, all the three complaints consist of a more or less extensive varicous state of the vessels of the conjunctiva, combined with a degree of preternatural relaxation, and thickening of that membrane.

In chronic varicous ophthalmy, the extraordinary amplitude, and knottiness of the vessels; the flaccidity, and thickening of the conjunctiva; are limited to the white of the eye. In opacity of the cornea, certain veins even dilate, and become knotty for some way over that delicate layer of the conjunctiva, which is continued over the surface of the cornea. In the pterygium, an extraordinary swelling of this subtile membranous expansion is added to the varicous state of its veins. Hence, the pterygium seems at first like a new membrane formed on the cornea, while it is really nothing more than the delicate continuation of the conjunctiva just mentioned, deprived of its transparency, and degenerated, in consequence of chronic ophthalmy, into a thick, opaque membrane, on which there is a plexus of varicous blood-vessels. Consequently, in the case of pterygium, there is no new production of the eye, but only an alteration of one of the thin transparent membranes, which naturally cover it. The following circumstance, as will be more fully explained presently, illustrates, says Scarpa, the veracity of the preceding statement. The incipient pterygium may be cured in the same manner as opacity of the cornea, viz. by merely cutting off that portion of it, which is situated at the junction of the cornea with the sclerotica, without detaching the whole of it from the surface of the former membrane; just as is practised in the opacity of the cornea, in order to destroy the communication of the varicous veins of the conjunctiva, with their trunks, the ramifications of which produce, and maintain the disease.

Scarpa observes, that the pterygium would be as common a complaint as the varicous chronic ophthalmy, so often occupying the white of the eye, if the delicate continuation of the conjunctiva over the surface of the cornea were not naturally of a denser, and more compact texture than the rest of the membrane, from which it is produced, and if its vessels were not very minute and delicate, and not so dilatable as those of the other part of the conjunctiva. This is the reason why the pterygium is comparatively a rare case, in respect to the great frequency of varicous, chronic ophthalmies. But should the vessels of the transparent layers of the conjunctiva once yield to the impulse of the fluid propelled into them; should they once become varicose, the cellular texture, in which they are enveloped, never fails to swell gradually, and thus the delicate, diaphanous membrane in question changes into a pulpy, reddish tunic, precisely similar to the pterygium.

That the pterygium is truly nothing else but the natural, delicate, transparent expansion of the conjunctiva, on the cornea, converted, for a certain extent, into a pulpy flaccid varicous membrane, may be inferred (continues Scarpa) from the folds, which the pterygium and conjunctiva form at the same time, when the morbid eye is turned towards the origin of the disease. The same inference is equally deducible from the tension occasioned in both these parts, whenever the eye is moved in the opposite direction. We become still more convinced of the fact on observing, that in the first position of the eye, both the pterygium and the corresponding portion of the conjunctiva (which is equally relaxed, varicous, and reddish,) may be easily taken hold of with a small pair of forceps, and raised together in the form of a fold.

The pterygium is observed by Mr. Travers to be most prevalent in warm climates. (*Synopsis &c. p.* 101.) It is also said to be most frequent in old people, though Mr. Wardrop, and Dr. Monteath have seen it in very young infants.—(*Weller's Manual of the Diseases of the Eye, Vol.* 1, *p.* 218.)

The constancy of the triangular figure of the pterygium, with its basis on the white of the eye, and its apex on the cornea, is one of its principal diagnostic characters, by which the true disease may be discriminated from every other soft, fungous, reddish excrescence, obscuring the cornea. For, on this membrane, excrescences sometimes form, which, from having the colour and consistence of a soft membrane, bear a very great resemblance to the pterygium, though they are really widely different, and, strictly speaking, consist of the texture of the cornea itself, degenerated into a soft, fungous substance. Such pellicles, however, not only almost always create a greater prominence on the cornea, than what accompanies the pterygium, but they are constantly of an irregular tuberous form, and never represent a triangle, with the apex pointing towards the centre of the cornea, like the genuine pterygium.

Another distinguishing character of pterygium, as Scarpa has observed, is the facility, with which the whole of it may be taken hold of with a pair of forceps, and raised into a fold on the cornea. Every other kind of excrescence, attached to this membrane, continues firmly adherent to it, and cannot be folded, and raised from the surface of the cornea, in any manner whatever. This particularity is of the highest importance in the treatment of the disease; for the genuine pterygium may be cured by simple means, while fungous excrescences of the cornea, can only be radically removed, and perfectly cicatrized with the utmost difficulty. Plenck very properly observes, on this head: *Pterygia, quæ filamentis solummodò adherent, facilè abscinduntur, difficilimè quæ ubique accreta sunt corneæ, ac in plicam elevari non possunt.*

Scarpa's belief in the reality of a *malignant* or *cancerous* pterygium must appear a doctrine requiring confirmation, when it is considered, that Mr. Travers makes no mention of the disease assuming this character, and Beer distinctly states, that, in a practice of thirty-two years, he has cured 376 pterygia, of various sizes and thickness, without one bad symptom, or consequence. And, hence, he justly concludes, that the disease is strictly local. (*B.* 2, *p.* 641.) This statement, however, is qualified with the condition, that the knife only be employed when requisite, and that no considerable portion of the disease be left unremoved.

The true benign pterygium, says Scarpa, which has a triangular figure, is ash coloured, or pale red, is free from pain, and admits of being raised in the form of a fold on the surface of the cornea, may be cured by cutting the opaque triangular little membrane accurately from the surface of the cornea, which is in part covered by it. But, as it appears, from what has been said, that the pterygium is nothing, but a portion of the delicate, transparent layer of the conjunctiva, converted by chronic varicous ophthalmy into a thick, opaque tunic, it follows, that the pterygium cannot be removed in any way, without the spot, which it occupies on the cornea, being bereft of its natural external covering. Also, as this denudation of the cornea renders a cicatrix unavoidable at the place, it equally follows, that the knife cannot be employed in the cure of the disease, without the cornea being rendered more or less opaque at the part, where the pterygium was before situated.

Scarpa's experience enables him to state, however, that the superficial, indelible speck, remaining on the cornea, after the recision of the pterygium, is always less extensive, than the space previously occupied by the disease.

It is customary (says Scarpa) to remove the pterygium by making the incision on the cornea, and extending it over the white of the eye, as far as the base of the disease reaches on the conjunctiva; so that when the pterygium grows from the internal angle of the eye, most surgeons continue the section as far as the caruncula This practice is disadvantageous, first, because it denudes too much of the white of the eye; secondly, because, in consequence of the large portion of the conjunctiva removed at the base of the pterygium, and in consequence of the direction of the wound, the cicatrix in the white of the eye forms an elevated frænum, which, like a little cord, keeps the eyeball approximated to the caruncula lachrymalis, and destroys the freedom of its motions, particularly towards the external angle.

In the treatment of pterygia with bases extending far in the white of the eye, Scarpa prefers detaching them at their apex, as far as the junction of the cornea with the sclerotica, and then to separate them at their base by a semicircular incision, comprehending one line in breadth of the substance of the conjunctiva, and made in a direction concentrical with the edge of the cornea. Scarpa has observed, that in this mode of operating, the subsequent cure takes place sooner, than when the common method is adopted; the cicatrix occasions no sort of frænum, and the conjunctiva, circularly stretched by the cicatrix, lies smoothly over the white of the eye, and loses that relaxation, and varicous state, which are the groundwork of the pterygium. Such attention, however, is not requisite, when the pterygium is small, and its base does not extend far in the white of the eye.

The operator, after desiring the patient to move his eyeball towards the part corresponding to the base of the pterygium, is to take hold of the membrane with a pair of forceps held in his left hand, and pinch it into a fold, at about one line from its apex. The duplicature is now to be raised, and drawn out gently until a sensation of something giving way is felt, which indicates the detachment of the pterygium from the delicate cellular texture by which it is connected with the subjacent cornea. Next, by means of a pair of scissors, the surgeon must dissect this fold, as closely as possible, from the cornea, proceeding from the apex towards the base of the pterygium. The section being completed to where the cornea and sclerotica meet, the fold is to be again elevated still more, and, with one stroke of the scissors, the pterygium, and the relaxed portion of the conjunctiva, forming its base, are to be detached, as concentrically, and closely to the cornea, as possible. This second incision will have a semilunar shape, the horns of which ought to extend two lines beyond the relaxed part of the conjunctiva in following the curvature of the eyeball.

When the operation is finished, the surgeon must promote the hemorrhage, by washing the part with warm water, and then cover the eye, that has been operated on, with a pledget of dry lint, or lint moistened in the liquor plumbi acet. dilutus, kept on with a bandage, that does not make too much pressure.

If no particular symptoms arise, such as pain, tension of the eye, considerable tumefaction of the eyelids, it is sufficient to wash the eye, and inside of the eyelids, three or four times a day with a warm lotion of mallows, and carefully keep these parts from being exposed to the air, without compressing them. If the symptoms just mentioned should occur, antiphlogistic treatment must be adopted.

On the fifth or sixth day, at latest, after the operation. all the surface, from which the pterygium was cut, appears yellowish, and covered with a fluid like mucus. The edges of the wound, and the adjoining part of the conjunctiva, assume a reddish colour. Afterward, the surface of the wound contracts more and more daily, and at length, completely closes.

During the whole treament, subsequent to the operation, there is no occasion to employ any other topical applications, but the warm lotion of mallows, three or four times a day. Numerous cases have convinced Scarpa that astringent collyria, and the boasted powders of the florentine iris and alum, cause great irritation to the eye operated on, and give rise to tumefaction, and a fungous state of the conjunctiva, which are impediments to the cure. What is still more incommodious, is, that such means produce fungous excrescences on the middle of the wound itself, which admit of being repressed and cicatrized with difficulty. Scarpa has seen all these inconveniences arise from one single unnecessary application of the argentum nitratum. On the other hand, when a mere lotion of mallows is the only remedy employed in the treatment, the cure proceeds regularly; the yellowish surface of the incision diminishes daily, and in three, or, at most, four weeks, the wound is quietly healed. The zinc collyrium, containing a few drops of camphorated spirit of wine, can only be prudently instilled, three or four times a day into the eye, for the purpose of obviating the relaxation of the conjunctiva and its vessels, after the wound is perfectly cicatrized.

The incipient pterygium (adds this author) is not a dense, opaque membrane, but a pellicle as fine as a cobweb, interwoven in different places with varicous blood-vessels, the iris continuing tolerably visible behind it. In this early state of the pterygium, it is unnecessary to deprive the cornea of its natural covering; it is quite enough to cut off a portion of it, in order to intercept all communication between the dilated venous ramifications of the pterygium, and the varicous trunks in the white of the eye.

The recision, says Scarpa, is accomplished by cutting out with a pair of forceps and scissors a semilunar piece of the conjunctiva, at the point where the cornea and sclerotica conjoin, and exactly at the base of the incipient pterygium, just as is practised for opacity of the cornea. The recent pterygium is observed to disappear gradually after the operation, or to change into a slight dimness of the cornea, extending over a part of the space previously occupied by the disease. This opacity is commonly much more trivial than what follows a cicatrix. Acrel, in his *Surgical Observations*, mentions having successfully treated an incipient pterygium in this manner. Scarpa has also tried the plan several times with success. Such treatment must be better than merely making two or three deep cuts, or scarifications, in the membrane near the edge of the cornea, as advised by Beer. (*B.* 2, *p.* 641.) And in proof of the uncertainty of the latter method, we find Beer himself speaking of the necessity of using stimulating applications, like powdered sugar, alum, the vinous tincture of opium, &c. if the operation is not of itself sufficient. In the *pterygium crassum*, Beer recommends the knife, as the best means of cure; but he differs essentially from Scarpa, not merely in preferring a knife to the scissors, but in beginning the operation by making a deep cut through the base of the pterygium in the white of the eye, from which point he continues the dissection of the pterygium, till this is all removed as far as its apex on the cornea, when he uses either the knife, or scissors, as most convenient. (*B.* 1. *p.* 643.)

Beer mentions that it sometimes happens, especially in cases of thin pterygia, that the disease stops at the edge of the cornea, and spreads no further, as long as the patient lives. (*B.* 2, *p.* 641.) Under such circumstances, of course the complaint will give no trouble, and may be left to itself, as particularly advised by Mr. Travers. (*Synopsis, &c. p.* 274.) When, however, it encroaches upon the sight, this gentleman says, that "it should be raised by dissection, as close as possible to the margin of the cornea, and the relaxed portion of the membrane removed by an incision, *midway between the base of the pterygium, and the cornea*, and concentric to that membrane." For further information, consult *J. Wardrop, Essays on the Morbid Anatomy of the Human Eye, Vol.* 1, *p.* 22, *&c.* 8*vo. Edinb.* 1808. *Scarpa sulle Malattie degli Occhi, cap.* 11. *Richter's Anfangsgr. der Wundarzneykunst, B.* 3, *p.* 141, *&c. Gottingen,* 1795. *Sabatier, De la Médecine Opératoire, T.* 2, *p.* 190, *Edit.* 2. *Beer's Lehre von den Augenkr. B.* 2, *p.* 636, *&c.* 8*vo. Wien.* 1817. *B. Travers, Synopsis of the Diseases of the Eye,* 8*vo. Lond.* 1820. *Weller's Manual, Vol.* 1, 8*vo. Glasgow,* 1821.

PTOSIS. (from πιπτω, to fall down.) *Blepharoptosis. Lapsus Palpebræ Superioris.* An inability of raising the upper eyelid. According to Beer, ptosis always arises from a considerable relaxation and extension of the common integuments of the upper eyelid, which hang down in a kind of fold over the fissure of the closed palpebræ, and when the levator muscle has been more or less weakened by the same causes, which have produced this state of the skin, the weight of the redundant integuments prevents the eyelid from being properly opened. Hence, when the patient tries to raise the eyelid, the efforts of the levator muscle may be seen; but, the object cannot be perfectly accomplished. With the exception of the inability of raising the upper eyelid, the patient has not the slightest ailment; the eye is not at all red, though, when opened, it does not bear the light well, on account of not being accustomed to the stimulus; no stillicidum lachrymarum is observable; and the edge of the eyelid, with all the eyelashes quite dry, is seen directly the part is elevated with the thumb. When the relaxed fold of the skin is taken hold of between the thumb and forefinger, without pulling or stretching it, but only just so as to take off the weight opposed to the levator muscle, by the redundance of skin, the patient is immediately able to raise the eyelid without any difficulty; but, as soon as the surgeon relinquishes his hold of the skin, the part falls down again. The relaxed fold of skin is sometimes situated rather over the outer commissure, than the middle of the eyelid, in which case, the latter part can be opened towards the nasal commissure, and the eyeball becomes habitually rotated towards the nose for the purpose of vision, whereby strabismus, and if the disorder be not soon rectified, an obliquity of sight, are occasioned. Beer adds, that some eyelids are formed with a predisposition to such an elongation of their integuments.

According to the same writer, a prolapsus of the upper eyelid may be the consequence of any inflammation of the part, accompanied with considerable œdema, or ecchymosis, as happens from severe wounds of the forehead, eyebrow, or the eyelid itself, particularly when no attempt is made to unite the parts by the first intention. The infirmity may also be the consequence of ophthalmy, that has been either long neglected, or badly treated with relaxing poultices, and it is said, that scrofulous patients have a disposition to the complaint. (*Beer, B.* 2, *p.* 109—111.)

The case, as described by this author, may be cured by the excision of a long slip of skin from the eyelid, just broad enough for the removal of the redundant quantity. For taking hold of the portion of integuments, Beer employs forceps, the extremities of which are broad, with a somewhat concave edge. As much of the superfluous skin is to be taken hold of, and raised, as will enable the patient to open the eyelid, which circumstance is the criterion of the quantity selected for removal being enough. The excision may then be performed with scissors, as Beer directs, or with a knife, as others may prefer; and the wound is to be closed with a suture. The slip of skin chosen for removal, should not be too near the edge of the eyelid, for then the skin of the lower edge of the wound, would be too narrow for the application of the the suture. (*Beer, B.* 2, *p.* 115.) Some writers refer particular cases of ptosis altogether to paralysis of the levator muscle; and other instances to spasm of the orbicular muscle. When the disease depends entirely on paralysis, the eye and surrounding parts, may be frequently bathed with cold spring water, and the eyelid and eyebrow rubbed with the camphor liniment, to which a little of the tinctura lyttæ is added. The shower bath, bark, and other tonics are also indicated. The cure of spasmodic ptosis, which is rather a symptom of other diseases, like hysteria, chorea, worms, &c. than a distinct affection, consists in the removal of the original complaint. However, generally speaking, antispasmodic medicines; blisters on the temple, or behind the ear; an issue between the mastoid process and angle of the jaw, as recommended by Adam Schmidt, on account of some nervous ramifications of the third branch of the fifth pair, which give twigs to the eyelids, lying in that situation; and fomenting and bathing the eye, eyelids, and face, with a decoction of poppy heads and cicuta; are means, which merit the consideration of the practitioner. (See *Richter's Anfangsgr. der Wundarzn. B.* 4, *p.* 488, 8*vo.* 3*d Edit. Gott.* 1802. *Weller's Manual, Transl. by Monteath, Vol.* 1, *p.* 97, *&c.* 8vo. *Glasgow*, 1821. *G. J. Beer, Lehre von den Augenkr. B.* 2, *p.* 109, *&c.* 8*vo. Wien.* 1817.)

PUNCTURED WOUNDS. See *Wounds.*

PUPIL. When the opening in the centre of the iris is preternaturally large, and this organ more or less deprived of its power of motion, the disease is technically named *mydriasis*, which is either *symptomatic*, or *idiopathic*. The first form of the complaint, as Weller observes, is exemplified in cases of hydrocephalus, hydrophthalmia, pressure on the brain from various causes, worms, amaurosis, &c. The second often presents itself as a paralytic affection of the iris; a state, frequently induced by the application of certain narcotics, like belladonna and hyosciamus. *Congenital* cases of mydriasis are also met with, as well as instances brought on by a long residence in darkness. A dilatation of the pupil may likewise be the consequence of an adhesion of the uvea to the anterior capsule of the lens. When the retina continues sensible, the inconveniences, produced by mydriasis, are intolerance of light, complete blindness in the daytime, and in the end amaurotic mischief, occasioned by the irritation of the immoderate quantity of the rays of light, admitted within the eye. The kind of prognosis, and the mode of treatment, must often depend entirely upon the primary affection, of which many cases of mydriasis are only symptomatic. Of course, the original disorder must always be cured, if possible. When mydriasis appears to arise from paralysis of the iris, blisters may be applied over the eyebrows, and the same remedies tried, which are usually employed in other local paralytic disorders. The entrance of too much light into the eye may be moderated with shades, and tubulated spectacles.

The case, which is the reverse of the preceding, is a preternaturally contracted, more or less immoveable state of the pupil, termed *myosis*. According to Weller, it is sometimes congenital. It is often met with as a symptom of other disorders, especially ophthalmy, inflammation of the dura mater, phrenitis, concussion of the brain, &c. Persons, whose business is to be looking at small shining objects, as watchmakers, often acquire a myosis from habit, and they cannot be cured of it, unless they avoid the causes which brought it on, keep themselves in a darkish room, and use a green shade, or tubulated spectacles. (See *Weller's Manual, &c. Transl. by Monteath, Vol.* 2, *p.* 54.) It is noticed by Beer, that myosis, when a sequel of ophthalmy, is less obvious than most other consequences of ocular inflammation; for though the iris is motionless, and the pupil considerably diminished, this opening is perfectly clear and black, and not drawn out of its usual position, nor its pupillary edge in the slightest degree angular. The patient, though he is continually complaining of weakness of sight, is able to distinguish (with some trouble indeed) even the smallest objects in the daytime, and in very light situations, but, his sight is evidently worse in the evening, and in darkish places in the daytime; for, when both his eyes are affected, he is in the dusk nearly blind, and can scarcely find his way. Beer remarks, that almost every considerable internal ophthalmy, or iritis, however favourably the disorder may be cured, and the eyesight restored, always leaves after it more or less contraction of the pupil, which affection, though not the least portion of coagulating lymph can be perceived in the posterior chamber, is combined with a partial, or complete immobility of the iris. Beer assures us, that every expedient, which he has yet tried for the permanent removal of this complaint has failed, the dilatation of the pupil, thus produced, being but temporary. And, with respect to the most powerful narcotics, he states, that in two cases, they were worse than useless, as they caused a still greater contraction of the pupil, which, however, after a few hours, resumed its former diameter. Hence, this experienced oculist is disposed to set down the myosis, following internal ophthalmy, as an incurable complaint. (See *Lehre von den Augenkr. B.* 2, *p.* 261, *&c.*)

The next case, demanding some notice in this work, is a *closure of the pupil* (*atresia pupillæ.*) According to Beer's observations, there is only one exception, in which in the adult patient a closure of the pupil is not the consequence of ophthalmy, and the case, here signified, is termed a *collapse of the pupil*, or *synizesis pupillæ*, the causes of which are said to be, either a very considerable loss of the vitreous humour from a wound of the eye, or else a dissolved, or rather disorganized state of the same humour, known among the oculists under the name of *synchysis* (See *Beer's Lehre, &c. B.* 2, *p.* 190.) Every internal ophthalmy, extending to the retina and choroides, when in its highest degree, is apt to produce a complete closure of the pupil. However, in such cases, as Beer remarks, the obliteration of this opening is not the only cause of blindness, for, long before this state of the iris happens, the sight is destroyed by considerable, and frequently irremediable, injury of the retina, and neighbouring textures, in which the inflammation is directly situated. An incomplete closure of the pupil, he says, is still more disposed to take place at the period, when the iritis passes from its first into its second stage, and syphilitic iritis is said to be particularly apt to leave after it this disagreeable consequence. (*Vol. cit. p.* 191.) In cases of the latter description, vision is not always quite prevented, but only more or less diminished, the coagulating lymph, effused in the posterior chamber having formed only a delicate, semi-transparent web. However, if in the second stage of the inflammation, such lymph should be converted into a dense membrane, with opacity of the lens and its capsule, the eye then only retains more or less perfectly the faculty of just distinguishing the light. But, when in such a case, the patient is completely insensible of the difference between light and darkness, the blindness, as in the examples mentioned above, is not owing to the closure of the pupil, or to the cataract, but to other morbid changes, resulting from the same inflammation, which caused the defect in the pupil itself, and capable of being ascertained by certain appearances in the eye. Passing over obstructions of the pupil by the unabsorbed matter of hypopium, and by the continuance of effused blood in the chambers of the eye, I come to the case, next noticed by Beer, in which a closure of the pupil arises from a partial adhesion of the iris to the cornea, (*synechia anterior,*) and will inevitably happen, when a considerable portion of the iris, or a great part, or the whole, of its pupillary edge protrudes through an opening in the cornea, and becomes adherent to it. However, as Beer observes, sometimes, in these cases, the pupil becomes completely obstructed, though the protrusion of the iris is inconsiderable, and its pupillary edge not engaged in the cicatrix; a circumstance exemplified, when the cicatrix over the adherent part of the iris expands very much, and has an extensive leucomatous surface, so that, though the pupil may be of considerable size, it is concealed, and vision impeded. And, even when there is no adhesion of the iris to the cornea, no synechia anterior, as it is termed, and no distortion of the pupil, a large dense cicatrix of the cornea may obstruct vision by lying exactly over that aperture. Lastly, as Beer has explained, the greater part of the cornea may be in an opaque, spoiled condition, so that the healthy iris can be discerned only here and there behind its circumference, no vestige of the pupil itself being distinguishable; and such concealment of the pupil, may be either combined, or not, with a partial adhesion of the iris to the cornea. In such cases, the patient can frequently perceive the light very well. (*B.* 2, *p.* 194, 95.)

From what has been stated, it is manifest, says Beer, that in many cases of atresia iridis, the prognosis must be highly unfavourable, and that no attempt to form an artificial pupil should ever be made when the patient's blindness proceeds from other causes, besides the imperforate state of the iris. Such an operation, Beer observes, can only be proper when the blindness is entirely owing to the closed or concealed state of the pupil; when the different degrees of light can be plainly distinguished; when the case is uncomplicated with any disease of other important textures of the eye, capable of rendering the manual proceedings difficult or impracticable; when the eye has been for a long time perfectly free from inflammation; when the patient is healthy, without any tendency to scrofula, syphilis, or gout; and both his eyes are completely blind. (*B* 2. *p.* 196.) Some questions may be entertained respecting this absolute prohibition of the operation in unhealthy subjects, because the line between the degree of health, requisite for the success of the operation. is difficult to specify, and gout, syphilis, and scrofula, are often vague expressions. Yet, no doubt can exist, I think, about the propriety of Beer's advice never to attempt the formation of an artificial pupil, when the patient enjoys vision with one of his eyes; for, when the new opening is made, as it is not in the axis of vision, the sight is confused in the other eye, unless the imperfect eye be kept closed, and the operation can never be done without exposing the patient to the risk of more or less inflammation in the eye, which is at present so useful to him. Whatever may be the differences of opinion about operating in cases of single cataract, I believe that all surgeons will unanimously join Beer in the foregoing advice respecting the imprudence of attempting to make an artificial pupil, when the patient can see with one eye.

Beer represents the event of the operation as being very uncertain, when the patient cannot plainly discern the various degrees of light; when the cornea is affected with leucoma, or scarred and spoiled nearly to its very circumference; when there is only a partial staphyloma of it; or the constitution is unhealthy or impaired by the effects of former attacks of scrofula, syphilis, or gout. Lastly, Beer sets down the operation as certainly useless, or even as likely to cause an entire destruction of the eye, when the patient is quite insensible of light; when the iris and neighbouring textures, such as the corpus ciliare, corona ciliaris, the membrane of the vitreous humour, this humour itself, and the blood-vessels of the organ, are in a morbid state, or the whole eyeball manifestly in a preternatural condition. However, an opacity of the lens and its capsule, even when the latter is completely adherent to the uvea, forms no prohibition to the formation of an artificial pupil, though it is a circumstance that has great weight in the selection of the method of operating. (*Beer, B.* 2, *p.* 197.)

The following information, from the same source, is highly important to the practitioner: the morbid state of the iris and other adjacent textures of the eyeball, contradicting the operation, may be known by the annexed circumstances. Together with the smaller circle of the iris, the larger one is strikingly changed, in respect to its colour, its consistence, and its layers. Its radiated fibres are collected into dark blue or blackish fasciculi, between which there is an appearance of empty interspaces, produced by the indentations of the iris, and actually semi-transparent, in consequence of the tapetum of the uvea having always been in these cases more or less annihilated by the previous inflammation. Around the cornea, the sclerotica seems bluish, or rather of a smutty grayish blue colour; and sometimes certain points of this membrane are protuberant. The morbid states of the whole eyeball, which may complicate the atresia iridis, and render the operation not only useless, but hazardous to the preservation of the eye, are its dropsical enlargement, (see *Hydrophthalmia*,) its atrophy; its preternatural firmness, from a general varicose affection of its blood-vessels; and its morbid softness from a disorganization of the vitreous humour. (*Beer, Vol. cit. p.* 198.)

Before proceeding further into the subject, I think it will simplify it very much to state, that numerous as the plans of operating for artificial pupils are, if we except the occasional plan of making a kind of artificial prolapsus of the iris, in order to change the position or shape of the imperfectly closed pupil, they may all be classed into three principal methods. 1. The simple transverse, perpendicular, or otherwise directed incision in the iris, now termed *corotomia*. 2. The excision of a piece of the iris, technically named *corectomia*. 3. The separation of a part of its circumference from the ciliary ligament, called in the language of oculists *corodialysis*. The excision of a portion of sclerotica, close to the cornea, with the view of forming an inlet for the rays of light to the retina, as proposed by Autenrieth, when the cornea is entirely opaque, may be considered a hopeless proceeding. With respect also to the three other methods, it is now well understood by all impartial surgeons, that the choice of them must depend upon the particular circumstances of the case, and that here it is as absurd to think of employing in all instances only one plan of operating as to have the idea of extending the same principle to all the forms and varieties of cataract.

Where the thing is possible, it is considered by Beer most advantageous to make the artificial pupil rather towards the inner canthus; though others express a preference to the centre of the iris. But, as Beer very truly remarks, since the new opening must be where the cornea is transparent, the operator is frequently obliged to form it either below, or towards the temple, or quite above; for there is often only just room enough left at one point for conducting the necessary manœuvres, with any degree of precision.

Cheselden first devised and executed a section of the iris, for the purpose of forming an artificial pupil. He introduced a couching needle, having a sharp edge only on one side, through the sclerotica, at the distance of a line and a half from the cornea, into the anterior of the eye. After perforating the iris towards the external angle, and then pushing the point of the needle through the anterior chamber of the aqueous humour, as far as that side of the iris which is nearest the nose, he turned the edge of the instrument backward, and withdrew it, so as to make a transverse division of that membrane. This operation seems to have been attended with the greatest success. However, Janin (*Mem. sur l'Œil*) assures us, that having performed it on two subjects with the utmost care possible, he did not find the smallest benefit follow it; for, in these two patients, as soon as the symptoms, produced by the operation, subsided, the transverse section made in the iris by the edge of the needle, reunited, and Sharp had experienced the same thing earlier than Janin. (*On Operations, chap.* 29.)

An accident occurred to Janin, in the act of extracting a cataract; viz. he included the iris together with the cornea, in Daviel's scissors, and cut it perpendicularly, and the division remained permanent. This led him to propose a perpendicular incision as the best expedient for making an artificial pupil. His plan consisted in opening the cornea, as is practised for the extraction of the cataract, and in dividing the iris perpendicularly with scissors, near that part of the pupil which is next to the nose; for, he affirms, that he has seen strabismus result from making the section towards the external side, on account of the two great divarication of the optical axes.

Although the practice of making an incision in the iris or corotomia, is severely disapproved of by Beer, who states that it admits of being practised only in very few cases, and is rendered quite unnecessary by what he considers the two other better plans, (*B.* 2. *P.* 199.) the operation is still considered by some men of experience, as having recommendations, and they have therefore endeavoured to improve it. However, it will only be in my power to notice in this work a few of its modifications.

In 1812, Sir W. Adams recommended the revival of Cheselden's method of forming an artificial pupil, with the difference of using for the purpose a particular sort of knife. "With a cataract needle (says this oculist) I could not cut through the iris by a gentle force; and if I ventured to apply a greater force, the iris separated from its attachment to the ciliary ligament, which rendered all further attempts to effect a central aperture useless. The same accident appears to have happened to Mr. Sharp in his trials of this operation. In the hopes of procuring an appropriate instrument, I twice went to London, at the interval of a few months; but though I described to different instrument-makers the purposes for which it was intended, still I could only procure the needle, which cuts on one edge, and the spear-pointed knife, of different sizes, described by Cheselden. At length it occurred to me that the curved edge of the common dissecting scalpel was well adapted to cut with facility. I therefore, when in London a third time, got a small knife made, two-thirds of an inch in length, and nearly a line in width, with a straight back, sharp point, and a curved edge, which cuts back towards the handle for about three lines." (*Adams's Pract. Obs. on Ectropium, &c. p.* 30.) According to this gentleman, in all cases where there is no crystalline lens, and the cornea is free from opacity, the division of the iris should be made in the centre, and should extend across at least two-thirds of its transverse diameter. In a later work, however, this author states, that experience has convinced him, that so extensive a division of the iris is unnecessary for the prevention of the reunion of this membrane, and that a cut through one-third of its diameter is sufficient. The eye being gently fixed, either with the finger of the assistant, who supports the upper eyelid, or with a concave sort of speculum, placed under the upper eyelid, the artificial pupil knife is to be introduced through the coats of the eye, about a line behind the iris, with its cutting edge turned backwards. The point is next to be brought forward through the iris, somewhat more than a line from its temporal ciliary attachment, and cautiously carried through the anterior chamber, until it has nearly reached the inner edge of that membrane, (or as is expressed in a later description,) "until it has traversed more than two-thirds of the width of the iris," when it should be almost withdrawn out of the eye, gentle pressure being made with the curved part of the cutting edge of the instrument against the iris, in the line of its transverse diameter. If in the first attempt, the iris should not be sufficiently cut, the point of the knife is to be again carried forward, and similarly withdrawn, until the incision is of a proper length. After the operation, the eye is to be covered with a plaster of simple ointment, and the patient put into bed, with his head raised. (*P.* 36, 37.) When the closure of the pupil is attended with a cataract, the primary steps of the operation are the same; but Sir William Adams takes care also to cut the cataract into pieces, some of which he brings forward into the anterior chamber, while others he leaves in the opening of the iris, where they at first serve as a plug, hindering union by the first intention, (*P.* 38.) and are afterward absorbed. For an account of this gentleman's particular methods in all the various complications of these cases, the reader must consult his publications, where many successful examples of the operation are recorded.

That Cheselden's method ought not to be entirely rejected, there can now be no doubt. Like all other modes of forming an artificial pupil, it certainly does not merit exclusive preference. Besides the authority of Sir W. Adams, we have the testimony of Mr. Ware, to prove that Cheselden's operation frequently succeeds. This gentleman informs us, that when the pupil has become closed, after an unsuccessful operation of extracting the cataract, he has in several instances made a new pupil, agreeably to Cheselden's mode of performing the operation, with the most perfect and striking success. "The fibres of the iris retracted as soon as they were divided, and left the pupil very nearly of its natural size. Its shape was not quite round; but the sight was immediately restored, and to so great a degree, as to enable the patient, by the help of suitable convex glasses, to see distinctly both near and distant objects, neither pain nor inflammation being consequent to the operation."

Where there is a prolapsus of the iris, through a breach of the cornea, involving more or less of the pupillary margin, Mr. Travers considers Cheselden's method the most applicable; "viz. the transverse division of the stretched fibres of the iris, and which, if the section be made in front of the membrane, i. e. from before backwards, admits of no improvement. The edges of the section instantly recede and form an excellent pupil." However, he afterward adds, "that a partial adhesion of the pupillary margin may be combined with a healthy lens. In this case, the removal of the free border of the pupil, drawn by means of forceps, through an incision in the cornea, will be preferable, on account of preserving the transparency of the lens." (*Synopsis of the Diseases of the Eye*, *p.* 343.)

In a modern work, Professor Maunoir of Geneva, has published a very successful case, in which an artificial pupil was formed, and a caseous cataract extracted. "I operated, (says M. Maunoir) on the right eye in the following manner. The patient being seated on a chair, and having the head inclined upon a cushion, I placed myself behind him, and with the fore-finger of the left hand, confining the upper eyelid, whilst an assistant depressed the lower, I made with the right hand a semicircular incision in the lower and external part of the cornea. This incision occupied a full third of the circumference of the membrane. On reopening the eye, the iris was seen projecting a little from the wound in the cornea. I replaced it with the blunt point of my scissors. Introducing the two blades closed into the anterior chamber, and then opening them, I caused the pointed blade to penetrate the iris, leaving the blunt blade between that membrane and the cornea; then closing the scissors, a perpendicular incision of the iris resulted, describing a little more than half the chord of an arc of two-fifths of the circumference of the iris, traced on the side of the temple. The first incision not having occasioned the formation of a pupil of the necessary size, I introduced the scissors into the iris a second time a little obliquely; and immediately the pupil appeared of a satisfactory form and size, but exhibiting the crystalline entirely opaque. The second stroke of the scissors had divided the capsula: I therefore introduced a small curette, in order to endeavour to destroy what adhered of the crystalline to the shrunk and contracted circumference of the old pupil. This attempt did not succeed. Lastly, I effected the passage of a portion of the opaque lens, by means of a slight pressure with a large scoop, exercised on the lower part of the globe of the eye. The crystalline, which was of a cheesy consistence, came out with the greatest ease, and though it was not entirely removed, yet a sufficient quantity was discharged to leave the artificial pupil of a most perfect black. This new pupil was on the side of the temple; and at the exterior and lower part of the iris." (See *Med. Chir. Trans. Vol.* 7, *p.* 305, *et seq.*) In this communication are also two other cases, in which Professor Maunoir operated with success, though complicated with cataracts, and adhesions of the lens to the iris. In some remarks annexed by Professor Scarpa to the preceding account, the latter expresses his opinion, that it is not necessary to be scrupulous, whether the crystalline be partly or entirely opaque, whenever the capsule is opaque, and adheres to the iris, behind the edge of the interior and enclosed pupil. "In this case only one remedy can be pointed out, namely, the removal of the opaque adherent capsule, and consequently of the crystalline, whether it be transparent or opaque. In the second place, (says Scarpa) I think there is no reason to doubt, that in similar cases, it is adviseable to make an incision upon the iris, proportioned to the size of the body to be extracted, rather than to make it small, which obliges the operator to divide the crystalline and the capsule, with the intention of extracting a part, and of abandoning the rest to the powers of absorption. Thirdly: I would establish as a fundamental principle, in similar cases, that after the complete extraction of the crystalline, with its opaque capsule, by means of the least possible introduction of the instruments, the artificial pupil ought not to be too near the incision in the cornea, and consequently not too near the cicatrix occasioned by it." (*P.* 317.) Scarpa then recommends a particular method of operating, in cases where there are cataracts: after having made, in the manner of Wenzel, a transverse incision in the iris, and in the cornea, he would introduce Maunoir's scissors, blunted at both points, into the anterior chamber of the aqueous humour, and make an incision in the iris, diverging from the cut made with the knife. The aperture thus made, Scarpa thinks would be large enough to allow easy egress to the opaque lens.

Among other late opinions professed by this distinguished surgeon, we find the following: that no instrument is so proper as the scissors for making an incision in the iris; that when the case is not complicated by cataract, a very small wound in the cornea is sufficient; that the formation of a triangular edge in the iris, by means of a double incision with the scissors, is the most easy and least painful of all the methods hitherto proposed for obtaining a *permanent* artificial pupil; and lastly, that spots of the cornea present no obstacle, because it is possible to produce the artificial pupil opposite the transparent part of that membrane. (*Med. Chir. Trans. Vol.* 7, *p.* 320,321.)

As I have already noticed, the contraction of the natural pupil is sometimes occasioned by the iris being stretched towards some point of the cornea, to which it is adherent. This state, as Scarpa observes, is most frequently accompanied with partial opacity of the cornea, around the adhesion, or prolapsus of the iris, as well as with opacity of the lens and its capsule. At other times, however, these internal parts preserve their natural transparency, notwithstanding the deviation of the natural pupil. In the latter case the pupil, though removed from its situation, is not in reality obliterated, but merely very much contracted, and incapable of admitting the quantity of light necessary for vision, especially if the opposite part of the cornea be slightly opaque. In such an example, Scarpa recommends making a small incision in the cornea at the most commodious part, when with Maunoir's scissors closed, and constructed with little buttons at the ends of both the blades, an endeavour is to be made to break the adhesion existing between the iris and the cornea. If this can be effected, the natural pupil generally recovers its former situation and size; but if the adhesion be very firm, Scarpa introduces one of the blades within the contracted pupil, behind the posterior surface of the iris, until the other blade has reached the confines of the cornea with the sclerotica. The iris is then to be divided in the form of the letter V, without at all injuring the capsule or lens, both of which are transparent. (*On the Principal Diseases of the Eyes, p.* 384, *Ed.* 2. *Transl. by Briggs.*) When, after extraction of the cataract, the pupil has been dragged down in this manner by adhesion to the lower third of the cornea, the upper two-thirds of which are transparent, Dr. Monteath, of Glasgow, has succeeded five times in forming an artificial pupil, and restoring vision by making a small opening in the upper and outer part of the edge of the cornea, capable of admitting Maunoir's eye-scissors, with which the overstretched fibres of the iris are to be cut across by one simple incision, three lines in length. The cut edges instantly recede, and leave an oval pupil of sufficient size. (See *Weller's Manual. Vol.* 2, *p.* 70.) In the cases above specified by Scarpa, Sir Wm. Adams, instead of performing corotomia, endeavours to separate the iris from the cornea, and then to alter the position of the pupil by drawing it towards that part of the cornea which has remained transparent. For this purpose he punctures the cornea about one line in front of the iris, separates the adhesion, and then makes the disengaged portion of the iris protrude through the puncture, and leaves it there, even using the forceps, if necessary, for drawing it out as far as is deemed necessary for its being securely fixed. This method is disapproved of by Scarpa, because a second prolapsus of the iris in the same eye appears to him a very serious disease, and rather calculated to increase the opacity of the cornea, and augment the contraction of the pupil, than afford relief.

According to Beer, the excision of a portion of the iris, *corectomia* is particularly indicated in all cases in which there is a sound transparent lens, as in many examples of synechia anterior, concealment of the natural pupil by a central opacity of the cornea, &c. Beer admits, however, as an exception, the instances in which the transparent portion of the cornea is so small, that no opening can be made in it with the knife, large enough to permit the iris to be taken hold of with a small hook or forceps, and a piece of it cut out above the ciliary processes. (*B.* 2, *p.* 200.) The reason here given, does not appear to myself very strong, because it may be asked, why not acquire more room by cutting a portion of the opaque part of the cornea? Weller assigns a better reason against corectomia, viz. when he refers to the risk of a sufficient piece of the cornea not being left transparent, opposite the new pupil, after the cicatrization of that membrane. (*Vol.* 2; *p.* 65.) Beer further states, that corectomia may be performed, in cases of atresia iridis consequent to the operation of extracting the cataract, when the surgeon is certain that no coagulating lymph, effused during the previous inflammation, in the posterior chamber, reaches above the lesser circle of the uvea, or is conjoined with opacity of the remaining capsule of the lens. The first state may be learned from the singular colour and form of the greater ring of the iris; the second, from the very indistinct manner in which the patient is sensible of the different degrees of light. (*Beer. B.* 2, *p.* 200.)

The excision of a piece of the iris, says Beer, requires the preliminary formation of a flap in the cornea, one line in length, with the cataract knife, and as close as possible to the sclerotica, so that no subsequent opaque cicatrix may interfere with the success of the operation. The second part of the business, viz. the excision of a piece of the iris, must be done in three ways, according to circumstances. 1st. The iris may be nowhere preternaturally adherent to the cornea, in which case, after an opening has been made in the latter membrane, the iris is propelled out between the edges of the wound by the aqueous humour, yet left in the posterior chamber, which opportunity the surgeon must immediately avail himself of for taking hold of the projecting piece of the iris with a very fine hook, and cutting it off with Daviel's scissors. The remainder of the iris is instantly retracted behind the cornea, and a well-formed pupil is immediately seen. 2. Only the part of the edge of the pupil may remain not adherent to and drawn towards the cornea, where it is intended to form the artificial pupil; a state best ascertained by a lateral inspection of the eye. In this case, after opening the cornea, Beer says, the operator is directly to introduce a small hook between the iris and cornea, so as not to injure either of these parts with its point, and he is then, with the instrument directed obliquely, to get hold of the pupillary edge of the iris, and while the iris is drawn out between the edges of the incision, the projecting piece is to be cut off with Daviel's scissors. Thus the natural pupil is to be extended behind the transparent part of the cornea, towards the edge of this membrane. 3. The pupillary edge of the iris may be adherent to the cornea exactly in the situation where the artificial pupil is to be formed: in this case, Beer directs the iris to be taken hold of at its greater circle with the hook, or, (if this should tear its way out) with a pair of fine-pointed forceps with teeth, drawn out between the edges of the wound, and the point of the cone, thus produced, cut off somewhat within the edges of the wound, as drawing the iris further out might tear it, and have a prejudicial effect. In all these cases, says Beer, the undiseased lens and its capsule will not be injured, if the patient keep tolerably steady, and the operator have already acquired dexterity in the extraction of the cataract. The operation being finished, the subsequent treatment is like that generally adopted after the extraction of the cataract. (See *Cataract.*) When corectomia is to be performed for a closure of the pupil, consequent to extraction of the cataract, Beer particularly recommends the forceps to be used, though he adds, that such operation is applicable only when the remaining capsule has not been spoiled by the traumatic inflammation, and the quantity of lymph in the posterior chamber is not so great as to reach above the lesser circle of the uvea.

The only other species of corectomia, which I deem it necessary to notice in this Dictionary, is what was proposed in the year 1811, by the late Mr. Gibson of Manchester. It is described as follows: "The first step of the operation is to secure the eyelids, as in the operation for extracting a cataract. A puncture is then to be made in the cornea, with a broad cornea knife, within a line of the sclerotica, to the extent of about three lines. All pressure is now to be removed from the eyeball, and the cornea knife gently withdrawn. The consequence of this is, that a portion of the aqueous humour escapes, and the iris falls into contact with the opening in the cornea, and closes it like a valve. A slight pressure must now be made upon the superior and nasal part of the eyeball, with the fore and middle finger of the left-hand, till at length, by an occasional and gentle increase of the pressure, or by varying its direction, the iris gradually protrudes, so as to present a bag of the size of a large pin's head. This protruded portion must be cut off with a pair of fine curved scissors, and all pressure at the same time removed: the iris will then recede within the eye, and the portion which has been removed will leave an artificial pupil more or less circular." (*Gibson's Practical Observ. on the Formation of an Artificial Pupil, &c. London,* 1811.) Such was this surgeon's mode of operating, when the closure of the pupil was attended with central opacity of the cornea, uncombined with adhesions. The effect of a slight adhesion of the inner border of the iris to the cornea, will be to prevent the protrusion of the first of these membranes through the puncture in the cornea, which protrusion so much facilitates the operation. In this case, a portion which does not adhere, must be drawn out with a small hook, and then removed. Sometimes the adhesion may be separated at the time of making the puncture, and then the iris will protrude. When the whole, or greater part of the inner border of the iris is involved in adhesions to the cornea, these must be separated with the cornea knife after making the puncture, and the iris may then either be drawn out with the hook, or a portion of it be removed by means of very minute scissors. In every case, however, the removal of a portion is essential to success.

When a cataract is known to exist, which it cannot often be, Mr. Gibson recommends it to be depressed, or broken to pieces with a needle, before making the artificial pupil; and, when the whole cornea is transparent, he advises forming a flap in the centre of the iris with the cornea knife, and then cutting such flap off with the iris scissors. (*Gibson, Op. cit.*)

Coredialysis, or the mode of forming an artificial pupil by detaching a portion of the iris from the ciliary ligament, is said to have been devised by Ad. Schmidt and Scarpa about the same time, and has been variously modified by Resinger, Langenbeck, Himly, Graefe, and others. (*Weller on Diseases of the Eye, Vol.* 2, *p.* 65.) According to Beer, this plan of operating is indicated, first only when the coagulating lymph, effused in the posterior chamber after the extraction of the cataract or reclination, (see this *word*) reaches from above the lesser circle of the uvea towards the ciliary processes; a circumstance which may be known by the considerable change of colour in the greater circle of the iris, and by the indistinct manner in which the patient perceives the light. Secondly, when the uvea is every where adherent to a secondary capsular cataract, or capsulo-lenticular cataract, or the closure of the pupil has been occasioned by a purulent or bloody cataract. Whenever the attempt is made in these last cases, however, the patient should be capable, as he sometimes is, of plainly discerning the light. Lastly, coredialysis is sanctioned by Beer when the cornea is every where incurably opaque, excepting so small a part of it, that it could not be well opened for the excision of a portion of the iris. (*B.* 2, *p.* 203.)

The feeble union of the iris with the ciliary ligament, and, consequently, the greater facility of detaching its edge from that ligament with which it is connected than of lacerating its body, induced Scarpa to try a new method of forming an artificial pupil, when the natural one has become too much contracted, or quite obliterated, after the extraction or depression of the cataract. His method of operating consists in detaching, by means of a couching needle, a certain extent of the circumference of the iris from the ciliary ligament, without making a section of the cornea. The attempt met with success.

The patient being seated and supported, as if he were about to have the operation for the cataract performed, a straight slender couching needle is to be introduced through the sclerotica, at the external angle of the eye, about two lines from the union of this membrane with the cornea; and its point is to be pushed as far as the upper and inner edge of the iris; in other words, as far as that side of the iris which is nearest the nose. The needle advances nearly to the ciliary ligament, and the surgeon perforates the internal edge of the iris, at its upper part, so that the point of the instrument scarcely appears in the anterior chamber, because that part of it being very narrow, the point of the instrument, however little it advance beyond the iris, would enter the substance of the cornea. The moment the needle appears in the anterior chamber, the instrument must be pressed on the iris from above downward, and from the internal towards the external angle, so as to bring it in a parallel line to the anterior surface of the iris, for the purpose of detaching a portion of the edge of this membrane from the ciliary ligament. This separation being effected, the operator must depress the point of the needle, in order to apply it to the inferior angle of the slit that he has begun to make. Then the aperture may be enlarged at pleasure by pushing the iris towards the temple, and withdrawing the needle from before backward, parallel to the anterior surface of the iris and the greatest axis of the eye. If, when this detachment has been accomplished, no opaque body appear at the bottom of the eye, the needle is to be withdrawn altogether. If any portion of opaque capsule, left behind after the depression or extraction of the cataract, should afterward advance, and present itself in the vicinity of the new pupil, the little opaque membrane must be reduced to fragments, and pushed through the artificial opening into the anterior chamber, where, Scarpa says, they will in time be dissolved and absorbed.

This separation of the iris from the ciliary ligament invariably occasions an extravasation of blood, which always renders the aqueous humour more or less turbid; but the turbidness is afterward absorbed, and the eye recovers its original transparency.

The patient, says Scarpa, complains, during the operation, of a vast deal more suffering than at the time when he undergoes the extraction or depression of a cataract. It cannot be otherwise; for, in detaching a part of the edge of the iris from the ciliary ligament, some filaments of the ciliary nerves, which proceed to be distributed to the iris, must at least be dragged or lacerated. However, on the whole, the symptoms consequent to this operation, have neither been obstinate nor fatal in the two cases which Scarpa has seen. From some experiments made on the dead subject, Scarpa thinks the curved needle, which he uses for the depression of the cataract, would also be better than the straight one, for making an artificial pupil. (*Scarpa sulle Malattie degli Occhi, Capo* 16.)

The celebrated Ad. Schmidt performed coredialysis with a lancet-pointed curved needle, which was introduced through the sclerotica into the posterior chamber, with its concavity towards the uvea. Its point is to pass as far as the portion of the ciliary ligament, where it is designed to make the artificial pupil. The iris is then to be pierced from behind forwards, about the fourth part of a line from the ciliary ligament, from which it is to be separated, the surgeon taking care at the moment to catch well hold of the iris with the point of the instrument, which is then to be withdrawn a little from the eye. If the new pupil should not be now large enough, the iris is to be again hooked with the needle, near the ciliary ligament, and the opening enlarged at its upper or lower angle, as may appear most advantageous. This plan is said to be adviseable when the whole cornea is opaque excepting a small spot.

When, however, the diseased state of the cornea does not forbid it, Beer and Schmidt very properly recommend the needle to be introduced into the anterior chamber, and the iris thus separated from the ciliary ligament; a plan which, as Weller observes, has proved more successful than the preceding method. In both modes, the lens will be pushed away from the new pupil by the movement of the needle, so that whether it be opaque already, or become so afterward, vision will not be obstructed by it. (See *Beer's Lehre, &c. B.* 2, *p.* 204—206, *and Weller's Manual, Transl. by Dr. Monteath, Vol.* 2, *p.* 66, *&c.*)

With the view of removing all risk of the new opening becoming closed again, Reisinger forms an artificial pupil, by making a small incision in the cornea, and introducing a minute double hook, which opens and shuts like a pair of forceps. After passing the hook closed into the anterior chamber, as far as the greater circle of the iris, he turns the points of both the small hooks towards this membrane, then opens the instrument a little, and hooks hold of the iris, which is to be separated from the ciliary ligament, when the instrument is to be shut again, and the part of the iris taken hold of drawn a little through the opening of the cornea, where it adheres, and cannot recede again towards the ciliary ligament. (See *Darstellung eines neuen Verfahrens die Mastdarmfistel zu unterbinden, und einer leichten und sichern methode künstliche Pupillen zu bilden.* 12*mo. Augsburg,* 1816.) Under certain circumstances, however, as there may be difficulty in drawing the iris through the cornea, or apprehensions may be entertained of the opacity of the cornea being increased by the protrusion and adhesion of the iris (the great consideration unquestionably against this method,) Reisinger approves of obviating the chance of the new opening being closed again, by removing a part of the iris, after its detachment from the ciliary ligament; a combination of *coredialysis with corectomia*, in the technical language of modern ophthalmology. Were I a patient, and coredialysis were deemed most applicable to the circumstances of my case, I should dispense with any excision of the iris, preferring the chance of the new opening being permanent, to the dangers of too complicated and protracted an operation.

Langenbeck is the inventor of an instrument for the formation of an artificial pupil: it is a silver tube, to one end of which is attached a very small gold one, containing a minute hook, capable of being moved backwards or forwards, to the extent of only two lines, by means of a spring in the silver tube. The following is the account of Langenbeck's method, as extracted by Mr. Guthrie from his writings. "A very small opening is to be made in the cornea, in order that the iris, when brought out, may not recede. The hook, enclosed in the golden tube, (to prevent its bending from its tenuity) is to be directed to the spot where the iris is to be laid hold of. The hook is then to be pushed out by the spring to the extent of one line, which will be sufficient to enable it to penetrate the iris As soon as the hook is affixed, it is to be allowed to recede to its usual place in the golden tube, drawing with it the iris, which will be caught between it and the end of the tube, something in the manner of a pair of forceps. As soon as the hook begins to recede, a small black spot will be seen at the edge of the iris from its incipient separation, and care should be taken to insert the hook at, or even under the edge of the sclerotica, and as near as possible to the ciliary processes. The hook must recede gradually, the finger being kept steadily on, and moved slowly with the knob regulating the spring in the silver tube. As the chance of tearing off a part of the iris is proportionate to the distance it has to be drawn out the opening is to be made, as near as possible, to the spot where the separation is to be effected, taking care that the pupil shall be large enough, so that the prolapsed iris and subsequent opacity of the cornea cannot obstruct the entrance of the rays of light. The great advantage of this instrument, in Langenbeck's opinion, is, that the separation is effected, by means of the spring, more gently and gradually than by the finger alone, so that if a commencement of the separation be effected, the completion of it is certain, without any risk of tearing the iris. As soon as the hook has receded to the golden tube, carrying with it the iris, the whole instrument is to be gently withdrawn, moving it slowly up and down, in order to loosen the upper and lower attachment of the iris; for this membrane may be torn, if there has been much previous inflammation, or if direct force be employed in withdrawing it. The instrument always keeps its hold as firmly as the best forceps, and with much more advantage, for it occupies less space, and enables the operator to make the incision in the cornea small, on which the correct strangulation of the iris depends. In all his operations, the capsule of the lens has never been injured by this instrument, which he considers another advantage, and, he conceives, that it may be used through the sclerotica, without rendering the lens opaque, as by the methods of Scarpa and Schmidt." (The latter author, however, as I have explained in this article, did not operate through the sclerotica, when the lens was transparent.) When the cornea is transparent only at its outer edge, Langenbeck sometimes performs excision; but, when this membrane is opaque opposite the natural pupil, he opens the cornea near the edge of the sclerotica, and, if the iris will not protrude, he takes hold of its pupillary edge with the hook, and draws it between the lips of the wound, where he leaves it strangulated. (See *G. F. Guthrie on Artificial Pupil, p.* 63, *&c.* 8*vo. Lond.* 1819; *also Langenbeck's Neue Bibl.* 1 *B. p.* 1, 454, *and* 676, 8*vo. Hanover,* 1817—19, *and* 2 *B. p.* 13 *and* 106, where he answers some objections made to his instrument by Schlagintweit.) Doubtless, one cause of the failure of many operations for artificial pupil is one to which Mr. Guthrie has adverted, viz. the omission to keep down the subsequent inflammation of the iris and adjacent textures by the timely employment of the lancet and other antiphlogistic measures. On this subject, however, I need not here dwell, as the proper treatment is already described in that part of the article *Ophthalmy* which refers to idiopathic iritis.

As it is impossible for me to allot further room at present to the consideration of all the numerous modes of forming artificial pupils, I shall conclude with a list of works, in which further information may be found. *Cheselden in Phil. Trans. for* 1735, *p.* 451, *&c. Sharp's Operations, Chap.* 29. *Janin Mém. sur l'Œil. Richter von der Verschlossenen Pupille in Anfangsgr. der Wundarzn. B.* 3. *Gött.* 1795. *Scarpa, sulle Malattie degli Occhi, cap.* 16; *or the English Transl. by Mr. Briggs, Ed.* 2. *Gibson's Practical Observations on the Formation of an Artificial Pupil, &c.* 8*vo Lond.* 1811; *a work of considerable merit. Wenzel on the Cataract. Sir W. Adams, Practical Observations on Ectropium, and on the modes of forming an Artificial Pupil, &c.* 8*vo. Lond.* 1812; *also on Artificial Pupil,* 8*vo. Lond.* 1819. *Roux, Parallèle de la Chirurgie Angloise &c. p.* 283, *&c.* 8*vo. Paris,* 1815. *Maunoir and Scarpa in Med. Chir. Trans. Vol.* 7, *p.* 301, *&c. G. J. Beer Ansicht der Staphyloma tosen Metamorphosen des Auges, und der kunstlichen Pupillenbildung, Wien,* 1815; *and Lehre von den Augenkr. B.* 2, *Wien,* 1817. *P. Assalini, Ricerche sulle Pupille Artificiali; in Milano,* 1811. *This author practises the detachment of the iris from the ciliary ligament with a particular kind of forceps. He must have an early claim to the invention, as he began the method in* 1786. *Jules Cloquet, Mém. sur la Mem-*

brane Pupillaire. Paris, 1818. *Maunoir sur l'Organization de l' Iris,* 8vo. *Paris,* 1812. *Benediet, De Pupillæ Artificialis Conformatione. Lips.* 1810. *R. Muter, Practical Observations on Various Novel Modes of Operating on Cataract, and of forming an Artificial Pupil,* 8vo. *Wisbeach* 1811. *G. F. D. Evans, Practical Observations on Cataract and Closed Pupil, &c.* 8vo. *Lond.* 1815. *Ch. Jüngken, Das Coreoncion, ein Beitrag zur Küntslichen Pupillenbildung.* 12mo. *Berlin,* 1817. *G. Wagner, Commentatio de Coromorphosi, sistens brevem method. ad Pupillæ artific. conformationem, novique ad Tridodialysin instrumenti descriptionem, cum tab. æn.* 8vo. *Brunswig.* 1818. *Schmidt and Himly Ophthal. Bibl. B.* 2 *and* 3. *Flajani Collezione di Osservazioni, T.* 4, 8vo. *Roma,* 1801. *Ryan, in Dublin Hospital Reports,* 1818. *Quadri Annotazioni Pratiche sulle Malattie degli Occhi,* 4to. *In Neapoli,* 1818. *Langenbeck Neue Bibl. für die Chir. B.* 1 *et* 2, 12mo. *Gött.* 1817—1819. *Reisinger Darstellung, &c. einer leichten, &c. Methode Kunstliche Pupillen zu bilden.* 12mo. *Augsb.* 1816. *Schlagintweit, Ueber den gegenwärtigen Zustand der Kuntslichen, pupillenbildung in Deutschland,* 8vo. *Munich,* 1818. *Donegana, Ragionamento sulla Pupille Artificiali; Milano,* 1809: *this work suggests the method of opening the sclerotica, under certain circumstances, for the purpose of dividing the iris from behind forwards. G. F. Guthrie on the Operations for the Formation of an Artificial Pupil,* 8vo. *Lond* 1819; *a work, containing a description of nearly every method hitherto suggested, accompanied with remarks. B. Travers, Synopsis of the Diseases of the Eye, p.* 334, *&c.* 8vo. *Lond.* 1820. *C. H. Weller, A Manual of the Diseases of the Human Eye; transl. by Dr. Monteath, Vol.* 2, *p.* 55, *&c.* 8vo. *Glasgow,* 1821.

PUS. (from πυον, matter.) The fluid, formed by the process of suppuration. (See *Suppuration.*)

R.

RACHITIS. (from ραχις, the spine of the back, because the disease was once supposed to depend on disease of the spinal marrow.) The rickets. See this word.

RANULA. (dim. of *rana,* a frog.) A whimsical name applied to a tumour under the tongue, arising from an accumulation of saliva and mucus, in the ducts of the sublingual gland. The term has either been derived from an imaginary resemblance of the swelling to a frog, or from the disease making the patient, as it were, croak when he attempts to articulate. Such writers as have treated of this disease, before it was known that the parts affected by it were destined for the secretion of the saliva, could have no accurate notions of its true nature. Celsus is supposed to have alluded to the ranula, in the fifth section of his seventh book, where, after treating of the diseases of the tongue, he continues with the following passage: *sub linguâ quoque interdum aliquid abcedit, quod fere consistit in tunica, doloresque magnos movet.* The latter circumstance, however, renders it probable, that some other affection was signified, as a ranula is rather attended with a sense of restraint, than of pain. Fabricius ab Aquapendente considered ranula as an encysted tumour of the meliceris kind. Dionis is of a similar opinion. Munick, better acquainted with the modern discoveries of anatomy, does not mistake the nature of the present disease; and he expressly says, that the affection originates from a thick saliva, which, not being able to pass out of the salivary ducts, accumulates under the tongue, so as to cause a swelling in that situation. Far from adopting the opinion of Munick, Heister fell back to that of Fabricius, and borrows every thing from this author.—Lastly, De La Faye, in his notes on Dionis, has taken up Munick's sentiments; he says, that "there are two sorts of ranulæ; some which are round, and situated beneath the tongue, seem only to be produced by a dilatation of the excretory duct of the sublingual gland; the others are longer than they are round; are situated at the side of the tongue, and are formed by a dilatation of the excretory duct of the inferior maxillary gland. The fluid, which fills such tumours, is the saliva, which gradually accumulates in them, in consequence of its viscidity and the atony of the duct.

Ranula is said to be frequently met with in persons who move their tongue a great deal, and in those who sing. The fluid in the tumour is precisely like white of egg; but it is thicker after having remained a long while in the swelling, and it is occasionally of a calcareous, and even stony nature. Ranula does not proceed from an inspissation of the saliva, as De la Faye supposed, but from an obliteration of the duct, or orifices of this tube. The collection often produces a tumour of very large size; but the swelling generally bursts when it has attained the dimensions of a walnut, and then leaves an ulcer, which cannot be healed while the real cause of the disorder remains unknown.

Mr. B. Bell mentions his having seen an ulcer of this kind treated with the utmost care for several months; various detergent and corrosive applications had been employed; and even a mercurial course; but all in vain. At length, the true cause of the disease having been ascertained, a cure was accomplished in a few days, by removing a piece of calcareous matter, which, by obstructing the ducts, had first caused a swelling, and then ulceration.

The opening, when made with a lancet, and not of sufficient size, frequently closes up again. In this case the swelling reappears some time afterward. The ancients made the same remark; and hence Paré preferred the actual cautery to the lancet. Dionis also mentions having seen ranulæ, which recurred in consequence of a mere opening having been made with a lancet, and he recommends, for the prevention of this inconvenience, the application of a mixture of honey of roses, and vitriolic acid to the inside of the cyst, so as to destroy it. As Louis remarks, all authors seem to regret that the situation of the tumour should prevent the sac from being totally dissected out. The success, which Fabricius ab Aquapendente experienced, when he merely opened the tumour its whole length, did not free him from this prejudice; and Heister says, he should prefer extirpation, if the nature of the adjacent parts, liable to be wounded, were not a formidable objection. But if this pretended cyst, this pouch, is nothing else than the gland itself, or its duct, dilated by the retention of the saliva, it should not be irritated. Whenever a sufficient opening is made, no relapse takes place. Munick particularly advises such an incision, and Rossius mentions the smallness of the opening, among the defects in the treatment, and its being a cause of the disease returning. However, he also recommends destroying the sac; but specifies for the purpose only astringent drying applications, which act in a less powerful manner.

In a ranula of moderate size, there is nothing like a cyst absolutely requiring extirpation. It is generally enough to lay the cavity open, and cut off the edges of the incision, when they will not otherwise unite. M. Louis always observed that the radical cure depended on a fistulous aperture, through which the saliva continued to flow; and that, when this opening was situated behind the lower incisor teeth, a very annoying ejaculation of the saliva took place, in certain motions of the tongue. The cure cannot be complete unless this inconvenience be obviated. For this purpose, such an opening for the saliva must be made, as will not close.

The ranula, when of long standing, is sometimes so large as absolutely to hinder a person from articulating. Le Clerc has recorded a case, in which the root of the swelling extended under the tongue; the tumour filled the whole mouth; the prominence which it formed outwardly was as large as a duck's egg; and the disease, in its progress, had made the teeth of both jaws project outward. At some parts of its surface, a fluctuation was perceptible; other places were exceedingly hard. The patient, who could scarcely breathe, demanded assistance; and a puncture was made in the softest part of the outside of the swelling. A thick yellowish fluid issued out of the ranula. The opening was enlarged with a knife, and about a pint of gritty inodorous matter was extracted. There was no hemorrhage from the cut; and no sooner had the contents of the swelling been let out, than the patient began to articulate, which he had not been able to do for a long while. The sides of the tumour being so prodigiously distended, Le Clerc thought proper to destroy the inside of the cavity with a tent dipped in a mercurial solution. The cure was completed in a month, and the tongue gradually regained its original size, a part of which it had lost.

But, as M. Louis observes, fortunate as the termination of this case was, it must not be indiscriminately set down, that destroying the cyst, or even opening the tumour, is always requisite. A more simple method will sometimes succeed. In a particular case, which this gentleman has related, a sinuosity, which divided the swelling into a right and left portion, made him suspect that it consisted of two sacs, in contact with each other. On each side, in front, and in the same line, there was a point, which was the orifice of the salivary duct, somewhat dilated, and blocked up with a viscid matter. Having very easily passed a small probe into the orifices, a matter similar to white of egg, made its escape. A small leaden probe was passed into each opening, and two days afterward, the sacs were emptied again, and two pieces of lead, somewhat larger, introduced. The man was advised to take out the pieces of lead every morning, empty the swelling, and then replace them. In a fortnight, the openings having been kept continually dilated, had no tendency to close; the saliva did not accumulate, and the ranulæ never appeared again.

In certain cases, the above means are quite inadequate, and the tumour must be totally extirpated. Boinet has related to the French academy, a case in which the swelling not only filled the whole mouth, but one half of the tumour projected out, and a cure could only be accomplished in the latter manner. The two upper incisor teeth on the left side, were lodged in a depression observable there; and the canine tooth, of the same side, forced outward by the mass of the disease, had pierced the lip near its commissure. A fluid resembling mucus, flowed from a narrow aperture at the lower part of the swelling. The tongue could not be seen, so much was it pushed backward, and for some time, the patient had only subsisted on liquid food, which he was first obliged to convey to the back of the throat with some mechanical contrivance. The four incisor teeth, two canine, and first grinders of the lower jaw, had been pushed out of their sockets, by the pressure of the swelling. The patient's aspect was alarming, and he was threatened with suffocation. Extirpation was deemed necessary, and it was performed with all the caution which the situation of the tumour demanded. The large cavity thus occasioned was filled with lint. The lower jaw being diseased, Boinet scraped some of its surface off, and covered the places with lint, either dry or dipped in spirit of wine. Some exfoliations followed, and the fungous granulations which grew were repressed with proper applications. In three months, the parts were healed in so regular a manner, that the motion of the tongue was not in the least obstructed, and no change continued, except the alteration of the voice, occasioned by the loss of teeth. This case is very interesting and proves how much may be hoped for in difficult cases, from prudent and judicious measures. (See *Encyclopédie Méthodique, Art. Grenouillette. Mém. de l'Acad. de Chirurgie, T. 3, Sabatier. Médecine Opératoire, T. 2, p. 19, &c. Ed. 2. Callisen, Systema Chirurgiæ Hodiernæ, Vol. 2, p. 108, &c. Hafniæ, 1800. Lassus, Pathologie Chir. T. 1, p. 402, &c. 8vo. Paris, 1809. Richter, Anfangsgr. der Wundarzn. B. 4, Kap. 1, Gottingen, 1800. J. J. Stahl, et J. F. E. de Schoenerben de Ranulâ, sub linguâ, speciali cum casu, Erford.* 1734.)

RECLINATION. A term much employed abroad, to denote the operation of turning a cataract, so as to change the position of its anterior and posterior surfaces. (See *Cataract.*)

RECTUM. Many cases in which this bowel is more or less concerned, are treated of elsewhere in this Dictionary, and therefore it will only be necessary for me here to refer to them, and then notice some diseases of the part, which are not considered in other articles. For an account of piles, hemorrhoidal excrescence, and other tumours of the rectum, see *Hemorrhoids;* and for that of prolapsus ani, fistula in ano, and imperforate anus, see *Anus.* Under the head of *Alvine Concretions,* I have noticed the dangerous obstruction of this bowel by masses of indurated matter. In the article *Lythotomy,* the mode of cutting through the rectum into the bladder, for the purpose of extracting a calculus from the latter organ, is explained; and if the reader refer to *Bladder,* he will there find a description of the method of tapping it from the rectum.

Scirrhus, or *stricture of the rectum,* sometimes called the *scirrho-contracted rectum,* and sometimes *cancer,* especially when the case is inveterate and in a state of ulceration, is a disease which has received much elucidation from the writings of Desault, Sir Everard Home, Dr. Sherwin, and Mr. Copeland. In the various descriptions given of the complaint by these and other writers, one great point of difference is remarkable, viz. that some of them represent the case as always of an incurable nature, while others consider it as admitting of relief, at least when it has not made considerable progress, and the parts are free from ulceration. According to Desault, scirrhus of the rectum is not uncommon at an advanced period of life, and the disease is said to afflict women more frequently than men, as from a table kept at the Hôtel Dieu, it appeared that ten cases out of eleven occurred in females. If it were not for the fact, that Desault sometimes effected a cure of the disease in its early stage, I should venture to conclude, that his observations apply entirely to the true scirrhus, or cancer of the rectum, which I believe rarely or never occurs in young patients, but as Desault states, is not very unfrequent in elderly persons. My friend, Mr. Copeland, in his practical remarks, does not confine himself to really scirrhus and cancerous affections, but comprehends strictures of the rectum from a variety of causes; and this accounts for his statement, that the disease "*attacks people of almost all ages;* but is most common about the middle age." However, he agrees with Desault, that women are more frequently affected than men. He admits that it is sometimes cancerous, though not so often as is generally imagined, the mere induration not being an unequivocal proof of it. When the disease is really cancer, it is usually attended with more severe pain, darting through the pelvis to the bladder and the groin. The countenance is of a sallow leaden cast. (*Copeland on the principal Diseases of the Rectum and Anus, p.* 15—17.

Sometimes the disease extends over a considerable length of the gut, but is generally more circumscribed. The coats of the bowel become much thicker and harder than natural. The muscular is subdivided by membranous septa, and the internal coat is sometimes formed into hard, irregular folds. The surface of the inner membrane is occasionally ulcerated, so as to form a cancerous disease. Every vestige of the natural structure is sometimes lost, and the gut is changed into a gristly substance. The cavity of the bowel is always rendered narrow at the scirrhous part, and is sometimes almost obliterated. When the passage through the gut is very much obstructed, the bowel is always a good deal enlarged just above the stoppage or stricture, from the accumulation of the feces there. As the disease advances, adhesions form between the rectum and adjacent parts, and ulcerations produce communications between them.

As the disease at first is not very painful, it is usually not much noticed till somewhat advanced. The patient is habitually costive, and usually voids his stools with a little difficulty. In time, a good deal of pain is felt in the part affected, especially at stool, after which some relief is experienced. "As the gut continues to decrease in diameter (says Mr. Copeland,) the efforts to expel the feces become more violent, and the consequent progress of the disease more rapid. The stools, which have been long evacuated with difficulty, become contracted in size, appearing like earth-worms in their form, or small pellets;" and if the finger be introduced into the rectum, "the gut will be found either obstructed with small tubercles, or intersected with membranous filaments; or else the introduction of the finger will be opposed by a hard ring of a cartilaginous feel, composed of the diseased inner membrane of the intestines." These states, as Mr. Copeland observes, are very different from the regular tumour on the anterior part of the rectum, occasioned by an enlargement of the prostate gland; a case apt to be suspected. "As the disease advances (says the same author,) the feces become more fluid, and there is a thin saneous discharge from the anus, accompanied with tenesmus." According to Desault, pus and blood may sometimes be noticed with the excrement, particularly when the disease has advanced to the ulcerated state. The patient at length becomes sallow, frequent eructations of air from the bowels, as Mr. Copeland observes, torment the patient, and render his life miserable; the constitution suffers, and dissolution follows. Severe tenesmus attends the whole course of the disease. (*Œuvres Chir. par Bichat, T.* 2.)

Sometimes a small fistulous orifice at the verge of the anus communicates with the inferior portion of the diseased part. Such a fistula, in a case recorded by Sir Everard Home, was half an inch in length. (*Obs. on Cancer, p.* 133.)

Desault has often seen the disease form a communication between the rectum and vagina, and the feces passed through the latter part. In the latter stage of the affliction, the rectum, bladder, vagina, uterus, and adjacent parts, are all involved in one common ulceration.

When the disease has attained the ulcerated state, it is probably always incurable. Palliatives can only now be resorted to, such as anodyne and emollient glysters, the warm bath, &c. with the exhibition of medicines like opium, cicuta, uva ursi, &c. Claudinus applied his remedies to the inside of the bowel, by means of tents, and did not employ the latter as a mode of curing the disease when less advanced. Valsalva introduced a cannula, pierced with numerous holes, and then made his patient get into a bath, so as to let the fluid enter the intestine. Numerous practitioners, among whom is Morgagni, made mercurials the base of their treatment, from a supposition that the complaint was of venereal origin. I believe the latter opinion is at present entirely abandoned by all the most judicious surgeons in England, and this, whether mercury ever prove useful or not.

When the disease is not attended with ulceration, the contraction and thickening of the gut may be diminished by introducing bougies, keeping them for a certain time, every day, so introduced, and increasing their size gradually. The pressure of these instruments seems to lessen the disease, and stop its progress; a proof that its nature differs from that of a common malignant scirrhus. Desault used to employ long tents made of lint, smeared with cerate, and passed into the bowel by means of a probe with a forked end. Their size was gradually increased, so as to keep up the compression, to which, it was conceived, all the good was owing. Their length was also augmented by degrees. At first, fresh ones were introduced twice a day. When any hardnesses were situated on the outside of the anus, Desault cured them on the same principle, viz. by making pressure on them with compresses and a bandage. In this manner he effected the cure of a scirrho-contracted rectum. The patient was taught to pass occasionally the tents, without assistance, in order to prevent a relapse.

Instead of tents, modern surgeons employ bougies for the dilatation of strictures in the rectum. When from habitual costiveness, the altered figure of the stools, and other circumstances, there is reason to suspect organic obstruction to the passage of the feces, and this suspicion is confirmed by an examination of the rectum with the finger, "the first object of the surgeon (says Mr. Copeland) should be an enlargement of the obstructed part, by the introduction of a bougie. This should be of such a size as to pass, when well lubricated with oil, without much difficulty or pain. Sometimes, when the disease has been of long continuance, it will be necessary to begin even with a large-sized urethra bougie, or one of the same size as those which are made for a stricture of the œsophagus, and of a length that is likely to pass beyond the end of the stricture, that is, about six, or seven, or eight inches. But I think it of consequence to use a bougie, at first, which is rather too small than too large." (*P.* 29.) When it has remained for half an hour, or more, it is to be removed, and passed again the next day, the same sized bougie being continued for several days. In the introduction of the bougie, Mr. Copeland cautions the practitioner not to mistake the projection of the sacrum for a stricture of the gut; a mistake which, he says, has often been made, and, as I believe, too often wilfully, and from motives of imposition. Mr. Copeland further advises the bowels to be kept constantly lax, by the use of castor oil, or electuary of senna, during the whole of the treatment. (*P.* 30.) Whatever be the nature of the stricture, whether it be that kind in which the rectum is obstructed by tubercles, by membranous filaments intersecting its canal, (which two species, Mr. Copeland says, are the most easily relieved) or whether it be the indurated stricture, from a thickening of the coats of the intestine, this local treatment is equally necessary. The plan is to be persisted in until a full-sized bougie will readily pass, and even after all symptoms have disappeared, it is recommended to introduce the bougie, and withdraw it again once every two or three days, for some time, in order to prevent a relapse. The indurated annular stricture, which long resists the bougie, Mr. Copeland sometimes divides with a probe-pointed curved bistoury on the side which is contiguous to the os sacrum; and he has frequently seen the late Mr. Ford perform the same operation. (*P.* 34.) When the disease is either combined with venereal symptoms, or there is any reason for suspecting it to be itself "the solitary symptom" of lues, Mr. Copeland joins Desault in recommending a trial of the effect of mercury, in conjunction with bougies. (*P.* 44.) The formation of abscesses, he remarks, is very frequent in the advanced stages of the disease, and he has often seen the common operation for fistula done under such circumstances without success. (*P.* 35.)

When any stoppage of urine occurs in the advanced stage of the disease, Mr. Copeland advises surgeons not to use the catheter hastily. (*P.* 39.) And, in the event of great pain and irritation in the rectum, he has seen the greatest benefit derived from the local application of opium either in a glyster, or by the introduction of one or two grains of the medicine within the anus. He also speaks favourably of the effects of the warm bath, and fomentations, in giving temporary relief; and he has also exhibited in these cases the pil extracti conii cum hydrarg. submur. with considerable advantage.

A fatal case of mortification of the rectum is detailed by Larrey. (*Parisian Chirurgical Journal, Vol.* 2, *p.* 398, *&c.* See *J. L. Petit, Œuvres Posthum. T.* 2. *Dr. Sherwin on the schirrho-contracted rectum, in Mem. of the London Medical Society, Vol.* 2. *Sir Everard Home, Obs. on Cancer, p.* 129, *&c.* 8*vo. Lond.* 1805. *L. F. J. Duchadoz, De Proctostenia, seu de Morbosis Intestini Recti Angustiis, Monsp.* 1771. *C. G. Siebold, De Morbis Intestini Recti Baillie's Morbid Anatomy, p.* 1116. *Œuvres Chir. de Desault, par Bichat, T.* 2, *p.* 422. *Observations on the principal Diseases of the Rectum. &c. by T. Copeland,* 1814. *W. White, Observations on the Contracted Intestinum Rectum,* 8*vo. Bath,* 1812.)

RESOLUTION. (from *resolvo.*) The subsidence of inflammation without any abscess, ulceration, mortification, &c. Also the dispersion of swellings, indurations, &c.

RETENTION OF URINE. See *Urine, Retention of.*

RETROVERSIO UTERI. A turning backward of the womb. See *Uterus, Retroversion of.*

RICKETS. (*Rachitis.*) Is mostly met with in young children; seldom in adults. Morand, however, (*Acad. des Sciences,* 1753.) mentions an instance, in which an adult became affected. The disease it is said, may even take place in the fœtus in utero; but the most common period of its commencement is in children, between the ages of seven or eight months, and two years. Hence, as Mr. Wilson observes, its origin has frequently been imputed to the effects of dentition. He adds, that he has often known it to make its appearance after this time, and that it not unfrequently attacks the spine a little while before puberty, and may do so even later. (*On the Structure and Physiology of the Skeleton, &c. p.* 162.) Pinel has given a description of the skeleton of a rickety fœtus. (*Fourcroy's Journal.*) The disease seems to consist of a want of due firmness in the bones, in consequence of a deficiency in the phosphate of lime in their structure. The causes of the affection are involved in great obscurity. Authors have referred them to scrofula, scurvy, lues venerea, difficult dentition, &c.; and Richerand still firmly believes, that rachitis is only one of the effects of scrofula in its worst forms. (*Nosographie Chir. T.* 3, *p.* 148, *Edit.* 4.) But these are merely conjectures, which will not bear a rigorous investigation. Professor Boyer, in particular, has well exposed their invalidity. *Traité des Mal. Chir. T.* 3, *p.* 611.)

Rickety subjects are often at the same time scrofulous; and this is, probably, the only reason for scrofula being accounted a cause of the other affection. The particular appearances of rickety children we need not detail, as every one is familiarly acquainted with them: such children are usually of a bad, weak constitution, and their limbs and bones become bent in directions determined by the action of the muscles, and the weight and pressure which they have to sustain. When the affection is very general, the spine becomes shorter, and is curved in various directions; the breast becomes deformed not only in consequence of the curvature of the spine, but by the depression of the ribs, and projection of the sternum. The bones of the pelvis fall inwards, and the os pubis generally approaches the sacrum. The latter circumstance is one of the causes of difficult parturition. The clavicles become more bent and prominent forward; the os humeri is distorted outward; the lower ends of the radius and ulna are twisted in the same direction; the thighs are curved forwards or outwards; the knees fall inwards; the spine and front surface of the tibia become convex; and the feet are thrown outwards.

According to the observations of Mr. Stanley, when the tibia and fibula become curved, they sometimes "acquire increased breadth in the direction of the curve, losing a proportionate degree of thickness in the opposite direction. Hence the bones become, as it were, newly modelled, passing from the cylindrical into the flattened form. This would seem to be designed for the purpose of enabling them to support more efficiently the weight of the body, since by this alteration they acquire increased breadth and power of resistance in that direction, where the greatest strength is required. I have never noticed (says Mr. Stanley) any expansion in the articular ends of rickety bones, as is mentioned by some authors. I should therefore feel inclined to believe, that there has existed only the appearance of such a phenomenon, the ends of the bones having appeared swollen, in consequence of the emaciation of the surrounding soft parts. (See *Med. Chir. Trans. Vol.* 7, *p.* 402—405.)

When the thoracic viscera are considerably oppressed by the alteration in the figure of the chest, produced by rickets, the disease may bring on fatal consequences.

Boyer has thus described the appearances of rickety bones: They are lighter than natural, and of a red, or brown colour. They are penetrated by many enlarged blood-vessels, being porous, and, as it were, spongy, soft, and compressible. They are moistened by a kind of sanies, which may be pressed out of their texture, as out of a sponge, or rather a macerated hide after it has been tanned. The walls of the medullary cylinder of the great bones of the extremities are very thin, while the bones of the skull are considerably increased in thickness, and become spongy and reticular. All the affected bones, especially the long ones, acquire a remarkable suppleness; but if they are bent beyond a certain point they break, &c. Instead of being filled with medulla, the medullary cavity of the long bones contains only a reddish serum, totally devoid of the fat oily nature of the other secretion in the natural state. (See *Boyer, Traité des Maladies Chir. T.* 3, *p.* 619.) The consistence of several rickety bones, examined by Mr. Stanley, was nearly that of common cartilage. They presented throughout an areolated texture, and the cells were in some parts large, and contained a brownish gelatinous substance. This gentleman did not find the periosteum thickened, as Bichat has described it. (*Anatomie Generale, T.* 3.) The investigations of Mr. Stanley have also discovered, that, in the process by which rickety bones acquire strength and solidity, there is always an undeviating regularity in the situation, extent, and direction of the deposited earthy matter. "Thus it is obvious (says this gentleman) that, in the curved bone, the part where there is the greatest need of strength, to prevent its further yielding, is in the middle of its concavity, or in other words, in the line of its interior curve; and it is just in this situation, that strength and compactness will be first imparted to the bone by the deposition of phosphate of lime. It will be further found, that the greatest resistance being wanted at this part, the walls are accordingly rendered thicker here than elsewhere, and the degree to which this excess in thickness is carried, bears an exact ratio to the degree of curvature, which the bone has undergone."

Mr. Stanley's observations also prove, that the bony fibres are arranged obliquely across the axis of the bone, in a direction calculated to augment its strength. Lastly, we learn from the same authority, that if a long bone, like the tibia, be very much bent, while it has to support a great superincumbent weight, the deposition of the bony matter may not be confined to the thickening of the walls of the concave side, but may extend across the medullary cavity, rendering the bone here perfectly solid, and thereby greatly strengthened. (See *Obs. on the Condition of the Bones in Rickets, &c. by E. Stanley, in Medico-Chir. Trans. Vol.* 7, *p.* 404, *et seq.*)

We learn from Mr. Wilson, that for many years past, he has also exhibited in his lectures preparations, illustrating the fact of the abundant deposition of osseous matter, "when the bones begin to recover from the disease, at the part where it is most wanted, viz. on the inner part of the concave surface of their curve." (*On the Skeleton, &c. p.* 167.)

Many very rickety and deformed infants improve as they grow up, and acquire strength. The deformity of their limbs spontaneously diminishes, and the bones gain a proper degree of firmness, a due quantity of the phosphate of lime being deposited in their texture.

It is a question, whether the restoration of the proper figure of the bones can be promoted by the constant pressure of bandages, and mechanical contrivances, sold in the shops. Some authors contend, that in very young children machines are useless, as the confinement and inactivity of the muscles, necessarily occasioned by such contrivances, must increase the general debility, and consequently the disease.

Notwithstanding the praises which have been bestowed on those mechanical means by their inventors, and even by respectable authors, says Boyer, they are not now used by any enlightened judicious practitioners, it being generally agreed, that it is best to leave to nature alone, aided by good medical treatment, the duty of rectifying bones deformed by the rickets. (*Traité des Mal. Chir. T.* 3. *p.* 627.) Delpech expresses himself still more strongly against the employment of machinery. (See *Précis Elémentaire des Maladies Chir. T.* 3, *p.* 740, *&c.*) However, these opinions against mechanical contrivances for the improvement of rickety bones, are not meant to apply to machines for rectifying distortions of the foot. In such cases, the malformation does not depend on constitutional causes, and mechanical means will do whatever is possible.

No medicine is known, which possesses any direct efficacy in cases of rickets. Tonics are indicated, and should be employed. The state of the bowels must in particular be attended to. The disease appearing to consist in a deficiency of lime in the bones, proposals have been made to exhibit internally the phosphate of lime; but this chymical project has had no success. (See *Bonhomme's Memoir on Rachitis, in Duncan's Annals for* 1797.

Several circumstances considered by Mr. Wilson, tend to prove, that this scheme could present no chance of benefit, because there is no proof of a deficiency of lime in the system, though the arteries of the bones do not deposit it in the natural degree. (See *Wilson on the Skeleton, &c. p.* 163, *&c.*)

More good is generally effected by keeping children in healthy situations, and in a salubrious air, than by any medicines whatever. Light, wholesome, nutritious, easily digestible food; cold bathing; good nursing; regular gentle exercise; or airings in a carriage; the use of the flesh-brush, &c. are also highly serviceable. The constitutional treatment of rickets belongs more properly to the physician than the surgeon; and it is not necessary to introduce more of the subject into a Dictionary expressly allotted to surgery.

See the article *Mollities Ossium*, and consult particularly *Buchner de Rachitide perfecta et imperfecta Disput. Argent.* 1754. *Glisson, de Rachitide, sive, morbo puerili. Ludg. Batav.* 1671. *Bonhomme's Mem. on Rachitis, in Duncan's Medical Annals for* 1797. *Riche-*

rand, Nosographie Chir. T. 3, p. 142. &c. Edit. 4. Leveillé, in Mém. de Physiologie et de Chirurgie. par Scarpa, &c. Boyer, Traité des Maladies Chir. T. 3, p. 607, &c. Stanley's Obs. in Med. Chir. Trans. Vol. 7, p. 404. Delpech Précis Elémentaire des Maladies Chir. T. 3, p. 739, &c. Trnka de Krzowitz, Historia Rachitidis, 8vo. Vindob. 1787. R. Hamilton Remarks on Scrofulous Affections, &c. 8vo. Lond. 1791. A. Portal, Obs. sur la Nature et sur le Traitement du Rachitisme, ou des Courbures de la colonne Vertébrale et de celles des Extremités, 8vo. Paris, 1797. And particularly, *Lectures on the Structure and Physiology of the Skeleton, Diseases of Bones, &c. by James Wilson, p. 159, &c. 8vo. Lond.* 1820.

RINGWORM. See *Herpes.*

RUPTURE. A protrusion of the abdominal viscera. See *Hernia.*

S.

SABINA. (said to be named from the Sabines, whose priests used it in their religious ceremonies.) Savine. The use of the leaves of this plant, in forming the active ingredient in the ointment commonly preferred for keeping open blisters, has been explained in the article *Blisters.* The other chief surgical use of savine, is as a stimulating application for destroying warts, and other excrescences. For the latter purpose, it is generally powdered, and mixed with an equal proportion of subacetate of copper. The same powder is also sometimes employed by surgeons for maintaining the hollows into which peas are inserted in issues. The best plan is, first to wet the peas, then roll them in the powder, and put them in this state on the issue. But when the whole surface of the issue has risen high, above the level of the skin, the powder must be sprinkled all over the sore, so as to produce an absorption of the high granulations.—Indeed, even in this manner, a good cavity often cannot be obtained; and it becomes necessary to destroy the surface of the issue, by rubbing it with caustic potassa, or potassa cum calce.

SACCHARUM SATURNI. Sugar of Lead. Cerussa Acetata. Acetate of Lead. This is very extensively used in surgery, chiefly as a local application to inflamed parts, and in the form of a lotion. See *Inflammation, Collyrium, Lotio, Gonorrhœa, Ophthalmy,* and numerous other articles of this Dictionary, for an explanation of the uses of acetate of lead.

SAL-AMMONIAC. *Ammonia Muriata. Muriate of Ammonia.* Employed a good deal by surgeons, as an ingredient in discutient lotions. See *Lotio Ammon. Mur.*

SALIVARY FISTULÆ. See *Parotid Duct.*

SANIES. (*Latin.*) A thin, serous, fetid matter, discharged from fistulæ, unhealthy sores, &c. It is sometimes tinged with blood.

SAPO TEREBINTHINÆ. (*Starkey's Soap.*) ℞. Potassæ Subcarbonatis calidi, ℥j. Olei Terebinth, ℥ij.—The oil of turpentine is gradually blended with the hot subcarbonate of potassa in a heated mortar. Indolent swellings were formerly rubbed with this application; and, perhaps, some chronic affections of the joints might still be benefitted by it.

SARCOCE'LE. (from σαρξ, flesh; and κηλη, a tumour.) A fleshy enlargement of the testicle. See *Testicle, Diseases of.*)

SARCO'MA, or *Sarcosis.* (from σαρξ, flesh.) A fleshy tumour on any part of the body. (See *Tumours, Sarcomatous.*)

SARSAPARI'LLA. The root of sarsaparilla was brought into Europe about 1530. It was at first reputed to possess singular efficacy in venereal cases; but afterward lost all its fame. Sarsaparilla was again brought into notice by Dr. W. Hunter, who advised Dr. Chapman to make trial of it in a bad case of phagedenic bubo; and the benefit obtained in this instance, led Dr. Hunter to extend the recommendation of the medicine. Sir. W. Fordyce stated, that sarsaparilla would quickly relieve venereal headachs, and nocturnal pains, and if persisted in, cure them; that in emaciated or consumptive habits, from a venereal cause, it was the greatest restorer of appetite, flesh, colour, and strength, which he knew of; that when mercurial frictions had been previously employed, it would generally complete the cure of the disease of the throat, nose, palate, or spongy bones; and that it would promote the cure of blotches and ulcers, and sometimes accomplish it, *even without mercury;* though, in this circumstance, there was danger of a relapse. Sir W. Fordyce pronounced sarsaparilla to be of little use in chancres; but that when these, or buboes, could not be healed by mercury, it would often cure, and always do good. He allows, however, that, in all venereal cases, *sarsaparilla is not to be trusted, unless preceded by, or combined with, the use of mercury;* and he thought sarsaparilla would, probably, always cure what resisted mercury. (*Medical Obs. and Inq. Vol.* 1.)

The celebrated Cullen considered sarsaparilla as possessing no virtues of any kind; for, says he, "tried in every shape, I have never found it an effectual medicine in syphilis, or any other disease." (*Mat. Med. Vol.* 2.)

Mr. Bromfield declares, that he never saw a single instance in which sarsaparilla cured the venereal disease without the aid of mercury, either given before, or in conjunction with it. (*Pract. Obs. on the Use of Corrosive Sublimate, &c. p.* 78.) Mr. Pearson also contends that sarsaparilla *has not the power of curing any one form of the lues venerea;* but he allows that it may suspend, for a time, the ravages of that contagion, the disease returning if no mercury should have been used. This gentleman admits, also, that sarsaparilla will alleviate symptoms derived from the venereal virus. He maintains, that the exhibition of sarsaparilla does not diminish the necessity for giving less mercury. Nocturnal pains in the limbs, painful enlargements of the elbow and knee, membranous nodes, cutaneous ulcerations, and certain other symptoms, resembling venereal ones, are often experienced after a full course of mercury. Such complaints, Mr. Pearson allows, are greatly benefited by sarsaparilla, and exasperated by mercury; and he observes. that it is from these complaints having been mistaken for venereal ones, that the idea has arisen, that sarsaparilla has cured syphilis when mercury had failed. Mercury, and the venereal poison, may jointly produce, in certain constitutions, symptoms which are not strictly venereal and are sometimes more dreadful than the simple effects of syphilis. Some of the worst of these appearances are capable of being cured by sarsaparilla, while the venereal viris still remains in the system. When this latter disease has been eradicated by mercury, sarsaparilla will also cure the sequelæ of a course of the other medicine." (*Pearson on the Effects of various Articles in the Cure of Lues Venerea*, 1807.)

The value of many of the foregoing opinions is mucha ffected by the results of modern inquiries into the nature of the venereal disease, the possibility of generally curing which, without the aid of mercury, seems well established, though the expediency of the method is another question.

SCA'LPEL. (from *scalpo*, to scrape.) Originally a raspatory, or instrument for scraping diseased bones, &c. The term now generally signifies a common, straight, surgical knife.

SCA'RIFICATION. (from *scarifico*, to scarify.) The operation of making little cuts, or punctures, in a part, for the purpose of taking away blood, letting out fluid in anasarcous cases, or air, in instances of emphysema.

SCIRRHUS; SCIRRHOMA; SCIRRHOSIS. (from *σκιρροω*, to harden.) The etymological import of these terms seems merely to be any induration. The first is now generally restricted to the induration which precedes cancer in the ulcerated state.

SCLERIASIS; SCLEROSIS. (from *σκληροω*, to harden.) A hard tumour, or induration.

SCRO'FULA, or SCROPHULA. (from *scrofa*, a sow.) So named, as is commonly supposed, because swine are said to be subject to it, though the correctness of this etymology is rendered very questionable by the remarks of Dr. Henning, and the statement, that pigs are really liable to scrofula would appear to be erroneous. (See *Critical Inquiry into the Pathology of Scrofula, &c. p.* 1, 9.) Called also, *struma*, and the *King's evil*, from the custom of submitting patients formerly to the supposed beneficial effects of the royal touch. A disease, one of the chief, or most palpable symptoms of which is a chronic swelling of the absorbent glands, in various parts of the body, which glands generally tend very slowly to imperfect suppuration. Our notions of scrofula, however, would be very imperfect, were we to define the disorder to be a morbid state of the lymphatic glandular system. The first appearances, indeed, frequently consist of spots on different parts of the body, and of eruptions and ulcerations behind the ears. As a judicious author remarks, the system of absorbent glands, it is true, seldom or never fails to become affected in the progress of the disease; but there is reason to believe, that scrofula frequently appears, for the first time, in parts which are not of a glandular nature. There are, perhaps, but few, if any, of the textures of the human body, or of the organs, which these textures form, that are not liable to attacks of scrofula, and to scrofula as an original idiopathic affection. (*Thompson's Lectures on Inflammation, p.* 134.) These sentiments are entirely at variance with those of Alibert, and many other moderns, who describe the disease as having its commencement in the conglobate glands, especially those of the neck, (*Nosol. Naturelle, T.* 1, *p.* 441, 4*to. Paris*, 1817;) and they are equally opposite to the doctrine of Dr. Henning, who argues, that the superficial absorbent glands alone are susceptible of the original action of the cause of this disease, and that if other parts become affected by it, such affection is consequential. (*On the Pathology of Scrofula. Chap.* 6.)

Scrofula generally shows itself during infancy, between the age of three and seven; sometimes rather sooner; but frequently as late as puberty, and in some instances, though a very few, not till a much more advanced period of life. In the latter cases, the disease is said to be rarely so complete, or well marked, as it is in young subjects. "Cette maladie (says Alibert) est communément le partage de la première enfance. Ill est rare qu'elle se développe chez les adultes. Je l'ai pourtant observée chez des septuagénaires; mais presque toujours, ce sont, les effêcts de la dentition qui la font éclore, et ceux de la puberté, qui la font evanouir." (*Nosol. Naturelle, p.* 448.)

By some authors, it is stated, that the disease seldom attacks the glands in children under two years of age. Dr. Thomson, however, has seen the glands affected before this period, and Dr. Cullen used to mention a case, in which the disease broke out in an infant only three months old; which, according to Dr. Thomson, is uncommon. But though glandular scrofula occurs most frequently in children, it is by no means confined to that period of life. Dr. Thomson has even found the lacteal glands affected with scrofulous inflammation in persons of very advanced age. (*Lectures on Inflammation, p.* 136.) Probably, however, such patients had laboured under scrofulous complaints in their earlier days; and it merits notice, that some authors, like Dr. Henning, (*P.* 110.) do not regard enlargement of the mesenteric glands, as an unequivocal specimen of scrofula. It is observed by Mr. Lloyd, that the susceptibility of different parts to the disease "is altered by age; thus, in children, the upper lip, eyes, glands of the neck, and those of the mesentery, are generally the parts first affected; the lungs, bones, and other parts being subsequently attacked. It happens sometimes too in children, that small lumps form under the skin in various parts of the body, which suppurate, ulcerate, and pursue the same course with scrofulous abscesses in general." (*On the Nature and Treatment of Scrofula, p.* 5.) The same gentleman likewise states, that a species of warts also often forms about the face and neck of children of a scrofulous habit, but seldom in adults. "In more advanced age, the eyes, upper lip, and lymphatic glands are comparatively seldom affected; while the lungs, the other viscera, and the spongy parts of the bones are frequently attacked."

Scrofula is also as hereditary as any disease can be; that is to say, it is so as far as any particular kind of temperament, or constitution, can descend, more or less completely, from parents to children. Mr. White, Dr. Henning, and others have strongly censured calling the disease hereditary; but their observations only lead to these conclusions, that children, born of scrofulous parents, are not invariably affected with scrofulous diseases; and that sometimes one child has some strumous affection, while the parents, and all the rest of the family, have no appearance of scrofulous habits. However, I still conceive that neither Mr. White, nor any other writer will maintain the opinion, that scrofula does not much more frequently afflict the children of scrofulous parents, than the offspring of persons who have always been perfectly free from every tendency to any form of this affliction. Too numerous are the facts which occur to my own mind, to allow me to entertain the smallest doubt, that scrofula runs very much in certain families. In this sense, I think the term *hereditary* perfectly accurate and allowable. But, at the same time, I beg the reader to understand, that I have no intention of questioning what seem to be irrefragable truths, viz. that the children of scrofulous parents often continue, as long they live, entirely free from the disease; and that one child is sometimes afflicted, while its father, mother, brothers, sisters, and all the rest of its relations, have never had any tendency to strumous disorders. It should also be recollected, that the doctrine of a congenital tendency to the disease in particular families is one which interferes with some theories which have been offered about the predisposing cause of the disease, as for instance, with that of Dr. Henning, who declares that such cause is foreign to the body, and depends upon peculiarities of climate; (*On the Pathology of Scrofula, p.* 69, *&c.*) an opinion, which is incorrect only in respect to its exclusion of the influence of other circumstances. Two curious specimens of tuberculated lungs in the fœtus are preserved in Mr. Langstaff's museum, and have been adduced by Mr. Lloyd, as positive proofs of scrofula being hereditary, (*On Scrofula, p.* 23;) however, I am not certain that they will be admitted as such by all parties, as tubercles of the lungs are not constantly regarded as a scrofulous disease.

When scrofula does not actually take place at a very early period of life, it is generally stated by writers, that the particular constitutions, in which there is a disposition to the disease, are, in a certain degree, distinguishable. In the individuals, possessing the disposition in question, a peculiar softness and flaccidity of fibre are remarkable; their hair is more frequently light coloured than dark; and their eyes are said to be more often of a blue, than any other colour. Their skin is generally very fine, and even handsome, both in regard to its outward texture and complexion. Subjects with scrofulous constitutions frequently have a thickening of the upper lip; this swelling is sometimes very considerable, and occasionally extends as far as within the nostrils. Scrofula is also very often complicated with rachitis, or follows the latter affection; but there is as little reason for supposing rickets to arise from scrofula, as this latter from rickets. In some instances, however, the complexion is dark, and the skin coarse; but in these subjects, at least when young, the face is generally tumid, and the look unhealthy. (*Burns on Inflammation, Vol.* 2, *p.* 232.)

In many instances, the last joints of the fingers have been observed to be enlarged, and the belly is generally larger than usual. (*Thomson, p.* 134.)

Mr. White, as I think, with some appearance of truth, denies that gray, or blue eyes, light hair, and a fair complexion, ought to be considered as marks of a scrofulous disposition; for the majority of children in this country have light hair, and eyes while young, which become darker as they advance in life. Now, as the majority of scrofulous patients are children, and young subjects, and as most children in this country have naturally the kind of hair and eyes above described, it seems inaccurate to lay any stress on persons affected with struma, or predisposed to this disease, having such appearances. (See *White on the Struma or Scrofula, p.* 38, *Ed.* 3.) However, it is to be recollected, that the greater frequency of scrofula in fair people is noticed in France, where the eyes are mostly dark. Thus, Alibert in his description of a patient disposed to the disease, takes notice of his swelled nostrils and upper lip; his florid complexion; his fair, delicate, glossy skin; his cheeks of a lively red colour; circumscribed, however, by a pallid bloatedness of the rest of the face. His blue eyes; dilated pupils; light hair; short neck; large head and lower jaw; flabby flesh; large, protuberant belly; strong intellectual powers, &c. (*Nosol. Naturelle, p.* 442; also, *Dict. des Sciences Méd. T.* 50, *p.* 281.)

Dr. Thomson expressly declares, that some of the worst cases of scrofula, which he has seen, occurred in persons whose complexion and hair were of a very dark colour. (*Lectures, p.* 134.) Another fact, which I think tends to impeach the accuracy of the common doctrine about complexion, is the circumstance of so many negroes being afflicted in this country with scrofula in its worst forms. Does not this fact indicate, at the same time, that it is climate, which is most powerfully concerned in the production of the disease; since the African black, in his own country, is nearly exempt from scrofula? After all, however, as the disease is undoubtedly very frequent in persons of fair skin, light eyes, &c. the term *alike*, at least in the sense of *equally*, may not be altogether correct in the following inference. viz. "that persons of every variety of complexion are *alike* subject to this disease, and that it is only necessary to place them in circumstances favourable to its developement, to have it fully formed." (*Lloyd on Scrofula, p.* 7.)

I believe the fact is now almost generally admitted, that females are rather more subject than males, to scrofulous disease. (See *Alibert, Nosol. Naturelle, p.* 449.)

According to Mr. White, struma prevails more extensively in temperate latitudes, than in very hot or very cold climates. It is also more frequent in some parts of Europe than others; and in this country it has been found to be most general in the counties of Suffolk and Lancashire. At all periods, it seems to have been a very common complaint in this island. From history, we learn, that it was denominated the king's evil in the time of Edward the Confessor, who is supposed to have been the first that attempted to cure it by the royal touch. From a register kept in the royal chapel, we find that Charles the Second touched 92,107 persons, in a certain number of years; and this equally bigoted and useless practice was not discontinued till a recent period, when kings were found to be, as well as their poorest subjects, totally destitute of all supernatural power.

Scrofula is not communicable from one person to another; neither can it be conveyed into the system by inoculation. The opinion also that scrofulous nurses may infect children, seems quite destitute of foundation. (See *White, p.* 56, 57.)

Pinel and Alibert have purposely kept scrofulous and healthy children together in the same ward, without any of the latter receiving the complaint. Hébréard could not communicate the disease to dogs by inoculation. And G. T. Kortum, whose valuable work contains every thing known about scrofula at the period when it was written, tried in vain to impart the distemper to a child, by rubbing its neck every day with the pus discharged from scrofulous ulcers. Lepelletier, desirous of ascertaining the correctness of such experiments, has of late repeated them: he has made guinea pigs swallow scrofulous matter, and he has injected it into the veins, and applied it to wounds; but in no instance was there even a temporary appearance of the disease being communicated. The same author also mixed scrofulous with vaccine matter, and inoculated with it; yet he never found the vaccine vesicle, thus produced, deviate in the least from its regular course. Lastly, Lepelletier inoculated himself with pus, discharged from scrofulous sores, as well as with the serum, collected under the cuticle of a strumous patient after the application of a blister; but he has remained free from every scrofulous ailment. (See *Dict. des Sciences Med. T.* 50, *p.* 294.) Our countryman, Mr. Goodlad, inoculated himself several times with the discharge from scrofulous sores and abscesses, and the result was, that the disease could not be thus transmitted. (*On the Diseases of the Vessels and Glands of the Absorbent System, p.* 113.)

The parts which are most frequently affected by scrofula, next to the lymphatic glands, and perhaps the skin, are the spongy heads of the bones, and the joints. The form which the disease assumes in the latter parts, is particularly described in the article *Joints.* The disorder of the spine, attended with a paralytic affection of the lower extremities, is no doubt very frequently of scrofulous origin. (See *Vertebræ.*) The spina bifida is a congenital disease, which is found to occur most frequently in children whose parents are scrofulous. (*Thomson's Lectures, p.* 133.) The abscess, which forms in the cellular substance, between the peritoneum and psoas muscle, is often regarded as a strumous disease; and when the contents of the abscess are found to contain flakes of a curdy matter, somewhat resembling white-of-egg, a substance peculiar to scrofulous abscesses, no one can doubt that the complaint is connected with this constitutional affection. (See *Lumbar Abscess.*) The chronic enlargement of the thyroid gland, is sometimes considered as scrofulous; but though patients, with this affliction, very often have, at the same time, other complaints, which are unequivocally strumous, though the enlargement of the thyroid gland most frequently commences at an early period of life, like scrofulous diseases, and though, like them, it is sometimes benefited by the carbonate of soda, the opinion, I think, is rather on the decline. (See *Bronchocele.*) Scrofula also frequently makes its appearance in the form of imperfect suppurations in various parts of the body; the contents of such abscesses being a curdy kind of matter, and the skin covering them having an unhealty red appearance, and a thickened doughy feel. The mesenteric glands are often found universally diseased and enlarged in scrofulous subjects; and as all nutriment has to pass through these parts, before it can arrive in the circulation, we cannot be surprised at the many ill effects which must be produced on the system, when such glands are thus diseased. However, as I have already hinted, doubts are entertained by Dr. Henning, whether enlarged mesenteric glands are decidedly scrofulous; but if his sentiment be incorrect, I fear he has been led to adopt it by his particular theory, which limits the origin of scrofula to the superficial absorbent glands. Scrofula frequently makes its attack on the testicle. (See *Testicle, Diseases of.*) The female breast is also subject to scrofulous tumours and abscesses

Dr. Thomson believes, that more or less local inflammation occurs in every form and stage of scrofulous diseases. He observes, that the swellings are very often from the first attended with a sensible increase of heat and redness, and that the pain, though seldom acute, is always present in a greater or less degree. Pressure on scrofulous swellings never fails to create pain; and the temperature of the skin covering them, is usually two or three degrees higher than that of the contiguous parts. (*Lectures, &c. p.* 131.)

Scrofulous inflammation (as Mr John Burns observes,) is marked by a soft swelling of the affected part, which very frequently is one of the lymphatic glands. The covering, or coat of the gland, becomes slightly thickened, and its substance more porous and doughy. The swelling increases, and the doughy feel changes by degrees into that of elasticity, or fluctuation, and a firm, circumscribed, hardened margin, can be felt round the base of the tumour. The skin is slightly red. If, at this time, an incision, or puncture, be made, either no matter, or very little is evacuated, the lips of the wound inflame and open, displaying a sloughy-looking substance within; and, betwixt this and the skin, a probe can often be introduced for some way all round If, however, the disease should have advanced further, then there is very little elasticity in the tumour; it is quite soft, rather flaccid, and fluctuates freely; the skin becomes of a light purple colour, and small veins may be seen ramifying on its surface. Some time after these appearances, the skin becomes thinner at one particular part, and here it is also generally rendered of a darker colour. It afterward bursts, and discharges a thin fluid, like whey, mixed with a curdy matter, or thick white flocculi. The redness of the skin still continues; but the aperture enlarges as the tumour subsides, and thus a scrofulous ulcer is produced. The margins of this kind of sore are generally smooth, obtuse, and overlap the ulcer; they are of a purple colour, and rather hard and tumid. The surface of the sore is of a light red colour; the granulations are flabby and indistinct, and the aspect is of a peculiar kind, which, says Mr. Burns, cannot be described. The discharge is thin, slightly ropy, and copious, with curdy flakes. The pain is inconsiderable. When this ulcer has continued for some time, it either begins slowly to cicatrize, or as more frequently happens, the discharge diminishes and becomes thicker. An elevated scab is next formed, of a dirty white, or yellowish colour. This continues on the part a good while; and when it falls off, leaves the place covered with a smooth purple cicatrix. Mr. Burns adds, that the preceding description corresponds to the mild scrofula, or the *struma mansueta* of the old writers This gentleman next remarks, that occasionally, especially if a bone be diseased below the ulcer, the sore has a more fiery appearance, the surface is dark-coloured, the margins soft, elevated, and inflamed, and sometimes retorted. The discharge is watery, the pain very considerable, and the surrounding skin inflamed. This has been called the *struma maligna.* Such overacting scrofulous sores are most frequently met with over the smaller joints, particularly those of the toes. (*Burns.*) Sometimes a scrofulous abscess, after it has burst, forms a sinus; the mouth of which ulcerates, and assumes the specific scrofulous appearance, while the track of the sinus still continues to emit a discharge. Mr. Burns also remarks, that scrofulous swellings are often disposed to subside in winter, and recur on the approach of summer; but, he adds, that this is not an invariable law. The glandular enlargements are very apt to become smaller, in a short time, in one place, while other glandular swellings originate with equal suddenness, somewhere in the vicinity of the former ones. Ulcers, also, very often heal upon the appearance of the disease in other parts. (See *Dissertations on Inflammation, Vol* 2, 1800.)

The glandular swellings, which occur in syphilis, says Dr. Thomson, are of a more acute character, than those which proceed from scrofula. They arise from the absorption of a specific poison; and they do not, like those of scrofula, admit of a spontaneous cure. Chronic swellings of the lymphatic absorbent glands occur also in carcinoma; but these manifest little or no disposition to suppuration; they succeed most frequently to carcinomatous indurations, or ulcers existing in the neighbourhood of the glands affected; and they are accompanied in their progress and growth by a peculiar lancinating pain. (See *Thomson on Inflammation, p.* 135.)

With regard to the proximate cause of scrofula, medical men may be said to remain, even at the present day, in entire ignorance of it. After the ridiculous theory, referring scrofula to certain humours in the constitution, or chymical changes in the blood, had been exploded, the opinion gradually arose, that it was a disease of the lymphatic system; and indeed, that the absorbent glands are often visibly the seat of its attack, when no changes are distinguishable in other textures, is a fact, that admits of no dispute. I believe, at the same time, that whoever supposes scrofula to be exclusively confined to the lymphatic system, must have a very imperfect conception of what is really the case. On the contrary, I fully participate in the sentiments of Professor Thomson, already adduced upon this point, and in the belief of another modern writer, that strumous complaints "are not to be considered as dependent on disease of any particular system, as the lymphatic." (*Lloyd, p.* 10.) Such writers as have fixed upon the absorbent vessels, as the particular seat of scrofula, can throw no useful light upon its origin, by following up the theory, whether they imagine the cause to be obstruction of the vessels and glands; or take up the wild speculation of Cabani, that in scrofula, the mouths of the lymphatics are in a state of increased activity, while the vessels themselves are in a state of atony; or the doctrine of Soemmerring, that scrofula depends upon a passive relaxation and dilatation of the absorbents; or the hypothesis of Girtanner, that these vessels are in a state of increased irritability. The idea of obstruction being the cause, has of late years been much on the decline; and that the convolutions of lymphatic vessels, forming the glands, are quite pervious, and may readily be injected, even when diseased, is a fact, first demonstrated by Soemmerring, which must weigh heavily against this opinion. Of the exciting causes, very little is also known. Mr. John Hunter remarks, that "in this country, the tendency to scrofula arises from the climate, which is in many a predisposing cause, and only requires some derangement to become an immediate cause, and produce the whole disease." (*Treatise on the Venereal Disease, p.* 26.) The disease is remarked to be most common in females; in cold, damp, marshy countries, and in all places near high mountains, where the temperature is subject to great vicissitudes. "Nous voyons presque toujours, (says Alibert) que les tumeurs et les ulcères se rouvrent au printemps pour se fermer ensuite vers la canicule." (*Nosol. Naturelle, p.* 449.)

In the work quoted the last but one, Mr. Hunter takes notice of slight fevers, colds small-pox, and measles, exciting scrofulous diseases. He observes, that in particular countries, and in young people, there will sometimes be a predisposition to scrofula; and that, in such subjects, buboes will more readily become scrofulous. (*P.* 27.) In short, it was one of Mr. Hunter's opinions, and probably a most correct one, that the venereal disease is capable of calling into action such susceptibilities as are remarkably strong, and peculiar to certain constitutions and countries; and that, as scrofula is predominant in this country, some effects of other diseases may partake of a scrofulous nature. (*P.* 96.) Mr. Hunter, speaking of venereal buboes, mentions his having long suspected a mixed case, and adds, "I am now certain that such exists. I have seen cases, where the venereal matter, like a cold, or fever, has only irritated the glands to disease, producing in them scrofula, to which they were predisposed. In such cases, the swellings commonly arise slowly, give but little pain, and seem to be rather hastened in their progress, if mercury is given to destroy the venereal disposition. Some come to suppuration, while under this resolving course; and others, which probably had a venereal taint at first, become so indolent, that mercury has no effect upon them; and in the end, they get well of themselves, or by other means." (*P.* 269.) For such buboes, Mr. Hunter used to recommend sea-bathing; and, in case of suppuration, poultices made of sea-water.

In the words of a well-informed Professor, scrofula readily forms an alliance with almost every morbid affection, occurring either from external injury, or from internal disease; it modifies the appearance of other diseases, and seems to convert them gradually into its own nature. Indeed, there are few of the local inflammatory affections, which occur in this country, in which the symptoms and effects of these affections, and the operation of the food and remedies employed for their cure, are not more or less modified by the degree of scrofulous diathesis, which prevails in the constitution of those who are affected by them. The scrofulous diathesis, wherever it exists, usually gives more or less of a chronic character to local inflammatory affections. (*Thomson's Lectures, p.* 131.)

It has been the fashion of late years to ascribe the origin of a vast number of diseases to disorder of the digestive organs, little trouble being generally taken to consider with any impartiality, whether the derangement of those organs may not be rather the common effect, than the common cause, of so many various diseases. Numerous circumstances tend to perpetuate the delusion, into which young practitioners are falling upon this topic. They see various diseases, attended with dyspepsia, flatulence, loss of appetite, costiveness, and a torpid state of the bowels; they observe that such diseases and the latter complaints of the alimentary canal, generally diminish together; that, when the functions of the stomach and bowels are deranged, any other diseases, which the patient may be labouring under, either grow worse, or are retarded in their amendment; and, lastly, the treatment, to which the theory leads, improves the health, by rectifying the state of the alimentary canal, and the sore, tumour, or other complaint, in the end, with the additional aid of time, nature, and other favourable circumstances, gets well. But, however simple, safe, and beneficial the practice may be, and plain as the facts are which lead to it, there is no proof, that the other disease was truly a consequence of the disorder of the digestive organs. The latter symptom I believe, is very frequently an effect mistaken for a cause, and perhaps, always so, in relation to scrofula. Besides, if it were to be assumed, (as indeed it actually is) that, in scrofula "there *always* is more or less disorder of the digestive organs, and *primarily of no other important function*," I do not see that we advance one step nearer the truth; because as the same cause is generally assigned, by gentlemen attached to this theory, for a vast number of other cases, we still remain in the dark, as to the circumstances, which make so many complaints of different kinds spring from one and the same cause. These circumstances, though buried in silence, are still the mystery—still the secret which is desired; and, if it be answered, that the effect will only happen in particular constitutions, then we are brought back at once to the point from which we first started, viz. that scrofula is a disease depending upon some unknown peculiarity of constitution, congenital or acquired, and capable of being excited into action by various causes, as climate, mode of living, &c. However, lest I may not have attached sufficient importance to the doctrine of gastric disorder being the cause of scrofula, I feel pleasure in referring, for the arguments in its support, to the writings of Mr. Abernethy, Dr Carmichael, and Mr. Lloyd, whose sentiments appear highly commendable, as far as they tend to teach surgeons rather to place confidence in means calculated to improve the health in general, as the most likely mode of benefiting the scrofulous patients, than to encourage foolish dreams about new specifics for the distemper. Thus far, I can follow these gentlemen safely; but no farther, except as a sceptic. However, perhaps none of the believers in the effect of disorder of the digestive organs mean to say, that such disorder is any thing more than one of the many exciting causes of scrofula; and with this qualification, their theory may, or may not, be correct. It is the doctrine of Alibert, and indeed of nearly all writers: "ce sont, les vices de la puissance digestive, qui preparent de loin les scrophules. Rien n' influe davantage sur leur développement que la mauvaise qualité des alimens, &c." (*Nosol. Naturelle, p.* 449.) "Ajoutez a cet cause le sejour dans les habitations malsaines." But, every explanation, even of exciting causes, remains unsatisfactory, as long as we find children living in the same air, under the same roof, and feeding and sleeping together, and clothed also exactly alike, yet, only one or two of them become scrofulous, while all the rest continue perfectly free from the disease. Here, then, we are again compelled to return to predisposition, constitution, diathesis, and a congenital tendency to the complaint, as a solution of the difficulty. In short, then, respecting the etiology of scrofula, little is known, except that certain constitutions probably have a congenital disposition to the disease; that such disposition may probably be increased, or diminished, by the operation of climate, mode of life, age, &c.; and that irritations of a thousand kinds may excite the disease into action, when the system is predisposed to it, by inexplicable causes. That climate has great influence cannot be doubted, when it is reflected, that the inhabitants of certain countries, in which the temperature is invariably warm, never suffer from scrofula. There can also be no doubt that, with age, the disposition to scrofula diminishes; for, children much afflicted while young, frequently get quite well when they approach the adult state; and, if a person has remained perfectly free from any mark of a scrofulous constitution till the age of twenty-five, he may be considered as nearly out of all danger of the disease.

TREATMENT OF SCROFULA.

"For the cure of scrofula, (says the celebrated Cullen,) we have not yet learned any practice that is certainly, or even generally successful. The remedy which seems to be the most successful, and which our practitioners especially trust to, or employ, is the use of mineral waters. But, (adds this eminent physician,) in very many instances of the use of these writers, I have not been well satisfied, that they had shortened the duration of the disease more than had often happened when no such remedy had been employed. With regard to the choice of the mineral waters most fit for the purpose, (says Cullen,) I cannot with any confidence give an opinion. Almost all kinds of mineral waters, whether chalybeate, sulphureous, or saline, have been employed for the cure of scrofula, and seemingly, with equal success and reputation; a circumstance, which leads me to think, that if they are ever successful, it is the elementary water that is the chief part of the remedy. Of late, sea-water has been especially recommended, and employed; but, after numerous trials, I cannot yet discover its superior efficacy." (*First Lines of Physic, Vol.* 4.) On the subject of mineral waters, Dr. Thomson very properly remarks, that they are now usually employed as purgative and tonic remedies, and not as specifics. In employing them it is often difficult to distinguish between the effects, which they in reality produce, and those which are to be attributed to the slow operation of time, the season of the year, change of situation, alteration in the mode of life, or exercise in the open air. (*Lectures on Inflammation, &c. p.* 195.)

In scrofulous diseases, Dr. Fordyce had a high opinion of bark; and he endeavoured to prove, that, in cases of tumefied glands, attended with a feeble habit, and a weak circulation, it is a most efficacious medicine, and acts as a resolvent and discutient. He also brings forward a case, in support of bark being a means of cure for the ophthalmia strumosa. (See *Med. Obs. and Inq. Vol.* 1, *p.* 184.) Dr Fothergill, in the same work, p. 303, writes in favour of the good effects of bark in similar cases; small doses of calomel being sometimes given with it.

Dr. Cullen considered the efficacy of bark in scrofula very dubious and trivial. (*First Lines, &c. Vol.* 4.)

According to Mr. Burns, bark has been frequently found useful in the cure of scrofulous inflammation, but more often of ulceration, than tumefaction of the glands. But, says he, it does not appear to possess, by any means, that certain power of curing scrofulous affections, which is attributed to it by Dr. Fothergill and several other authors. He observes, that we are not to suppose it will infallibly cure scrofulous inflammation, or ulceration of parts, which, even when affected with simple inflammation, are very difficult of cure. If it be difficult to cure a simple inflammation, or ulceration, of a tendon, cartilage, or bone, we must not be disappointed if even a specific remedy for scrofula, (were such ever discovered) should prove ineffectual in procuring a speedy restoration to health. Mr. Burns contends, that bark is often ineffectual, because improperly administered. Given in small quantities, once or twice a day, it may prove a stomachic, and increase, like other tonic bitters, the power of the stomach, or the functions dependent on it; but, in order to obtain the benefits of the specific action of bark, he maintains, that it should be given in large quantities, for several weeks, with a good diet, air, and proper exercise.—*Dissertations on Inflammation, Vol.* 2, *p.* 371.) Dr. Thomson does not believe, that bark, or iron, has any specific virtue in curing scrofula; but, he admits, that either of these medicines may sometimes prove useful in proving the tone of the digestive organs, when given after, or occasionally along with, a course of purgative mineral waters. (*Lectures, p.* 197.)

As far as I can judge, Mr. White has with much reason recommended paying attention to such circumstances as may have effect in preventing the disease, viz. air, cleanliness, exercise, and diet. He mentions cold-bathing among the preventives of struma, and speaks of sea-bathing as being the best. He advises attention also to be paid to the manner of clothing children, keeping them more covered in winter than summer. Mr. White thought, that allowing children to sleep a great deal was prejudicial; but this seems to me only conjecture.

In noticing the treatment of the disease, Mr. White states, that "the general idea of the struma is, that it is a disease of debility; and therefore, the great object is, to invigorate the habit by every possible means; the chief of which are tonic medicines, and sea-bathing. Some are of opinion, that in the case of young patients, this should be continued, during the summer months, every year, to the age of fourteen or sixteen. Many recommend it, not only in the summer, but throughout the year; whilst others are for administering alteratives, principally the alkaline salts, with or without antimonials, and the different tonics, during the winter; and the sea-water and sea-bathing, or cold-bathing, during the summer, for a continuance of two or three years from the commencement of the disease; with this general observation, that they will outgrow the complaint." Mr. White adds, that the chief external means are fomentations of sea-water, and cataplasms, made with the same. With respect to regimen, some recommend a milk and vegetable diet; others animal food and fermented liquors.

Mr. White maintains, that the preceding plans of treatment are not, in general, efficacious, though, in some instances, they may prove useful. "In early affections of the lymphatic glands, (says this gentleman,) and from the want of a pure air, and proper exercise, where children are delicate and irritable, a change of situation to the seaside, together with bathing, when they have acquired some strength, must be exceedingly proper; and, in gross plethoric subjects, who have diseased lymphatics, from improper feeding, and want of necessary exercise, a journey to the sea-coast may be very useful, particularly if the salt-water is drank often, and in a sufficient quantity to become purgative. This, with the novelty of their situation, which may naturally produce an increase of exercise, might answer every expectation; but these are the kind of cases that, with a very little attention, are easily cured. (*White on the Struma, Edit.* 3, *p.* 104.)

The conclusion, to which Mr. White's remarks upon this part of the subject tend, is, that sea-bathing only deserves praise, as a preventive, and in the early stages of the disease. He particularly condemns cold-bathing, for poor, weakly, debilitated children, whose thin visage, enlarged belly, and frequent tickling cough, sufficiently indicate diseased viscera; such do not recover their natural warmth, after cold-bathing, for hours, and their subsequent headach, livid lips, and pale countenance, are sufficient marks of its impropriety. (*P.* 107.)

Dr. Cullen entertained a very favourable opinion of cold-bathing, since he affirms, that he had seen scrofulous diseases more benefited by it, than any other remedy. (*First Lines of Physic, Vol.* 4.)

"Cold-bathing, especially cold sea-bathing (says Mr. Russell) is a remedy universally employed in scrofula, and I believe with great advantage in many cases; for it not only appears to improve the patient's general health and strength, but likewise to promote the tumescence of enlarged glands, and the resolution of indolent swellings in the joints, even after they have attained a considerable size, and have existed for a great length of time. But, in order that cold-bathing may be practised with safety and advantage, the constitution must have vigour to sustain the shock of immersion without inconvenience. If the immersion be succeeded by a general glow over the surface of the body, and the patient feels cheerful, and has a keen appetite, we may conclude that the cold bath agrees with him; but if he shivers on coming out of the water, continues chill, and becomes drowsy, we may be assured that the practice of cold-bathing does no good, and had better be omitted.

"In estimating the comparative merit of cold-bathing and warm-bathing, in the cure of scrofulous complaints, my own experience, together with the result of different conversations on the subject with some of the most judicious practitioners of my acquaintance, would lead me to bestow much more commendation on the effects of warm-bathing. I should not even be inclined to circumscribe the practice to cases of emaciation and debility, since from observation, I am fully satisfied with regard to the beneficial effects of the warm bath to patients of plethoric constitutions, who were much affected with those swelled scrofulous glands. Several of instances occurred in young women, about the prime of life, who were in all respects healthy and vigorous, abating the swellings of the glands, and those symptoms of distress which were connected with fulness of blood.

"The sensation of the warm bath is exceedingly grateful to most patients, and the practice is universally safe. It may be employed at all seasons of the year, and in all weather, without danger or inconvenience; the risk of suffering from exposure to cold, immediately after immersion in the warm bath, having been much magnified by prejudice. There is not even any good reason to believe in the existence of such a risk. The precautions, however, which are employed to avert it, are perfectly innocent; and provided they do not impose any unnecessary and incommoding restraints upon the practice, may be encouraged, so far as to relieve the patient's mind from uneasiness and groundless apprehensions.

"It requires many weeks, and sometimes several months, to ascertain the full effects of warm-bathing in relieving scrofulous complaints; but, as the practice is not attended with any inconvenience, nor followed by any bad consequence, there can be no reason to intermit the course, till the trial is completely satisfactory; and I am convinced, that the practice of warm-bathing, in cases of scrofula, will be more universally adopted, after the knowledge of its beneficial effects is more widely diffused." (See *Russell's Treatise on Scrofula.*)

Nothing can be more satisfactory (says Professor Thomson,) than the evidence which is on record, of the efficacy of the muriate of soda, as it exists in sea-water. In reading this, one only wonders how so efficacious a remedy should ever have fallen into neglect. (*P.* 196.) In a subsequent passage, however, the same gentleman evinces only a limited confidence in this means of relief. "Local sea-bathing, both cold and warm, has often appeared to be of use in procuring the resolution of scrofulous swellings. The temperature of the bath must always be varied according to circumstances, according to the season of the year, the strength and habits of the patient, and the particular effect, which the bath seems to produce. It is at all times difficult to distinguish between the effects immediately arising from the application of salt water to the body, and those which arise from the increased warmth of temperature in the bathing seasons of the year; from the exercise which patients going to sea-bathing generally take in the open air; from the change of situation and amusements; and, among the poorer classes, from the more nourishing diet and exemption from labour, in which they are usually permitted to indulge, during their residing at sea-bathing quarters. It is not improbable, that those living on the sea-coast, who become affected with scrofula, would for similar reasons, derive equal benefit by going from the sea-coast to reside for a time in the interior of the country." (See *Thomson's Lectures, &c. p.* 203, 204.) A still later writer declares his belief, that cold sea-bathing has no *specific power* over the disease. (*Lloyd on Scrofula, p.* 43.) Yet the plain surgeon, in search of practical truths, will not care whether any plan has a *specific power* or not over a complaint, if that disorder is sometimes relieved by it. And, that this is the fact is admitted by Mr. Lloyd, when he says, "cold sea-bathing, however, is certainly useful when judiciously applied, &c. &c." (*P.* 44.)

With regard to electricity, Mr. White thinks it useful, when from length of time the enlarged glands have acquired a degree of hardness and insensibility.

Mr. White, after enjoining attention to air, exercise, and diet, as promotive of a recovery, as well as a preventive of the disease, proceeds to explain his own practice. The internal cases, which properly belong to the physician, we shall dismiss from consideration. The first external symptoms, such as swellings of the lips, side of the face, and of glands under the chin, and round the neck; also other symptoms, usually considered as strumous, viz. roughness of the skin, eruptions on the back of the hand, and different parts of the body, redness, and swelling of the eyelids, and eyes; are accompanied, according to Mr. White's conceptions, with an inflammatory diathesis, though seldom such a one as to require bleeding. Calomel is the medicine, which this gentleman recommends for the removal of the foregoing complaints. It is not to be given in such quantities, as to render it a powerful evacuant, either by the intestines, or any other way; but, in small doses, at bedtime. Thus, says Mr. White, "it remains longer in the intestinal canal, a greater quantity is taken into the habit, and the patient is less susceptible of cold, than when taken in the daytime. The first, and, perhaps, the second dose may prove purgative, which is, in general, a salutary effect; but, afterward, the same quantity will seldom do more, than is sufficient to keep the body open; and should it fail of answering that purpose, I have usually recommended some gentle purgative, every third or fourth morning, according to circumstances. If there should be a prevailing acidity, a few grains of the sal sodæ, magnesia, or some testaceous powder, may be added to the medicine. By this simple method (continues Mr. White) most of the symptoms before-mentioned will, in a short time, disappear; but if the tumours should continue hard, and retain their figure, without dividing into smaller ones, we may derive some benefit from external applications, particularly the steam of warm water. I have used a variety of medicinal herbs with success; but am inclined to believe, that the advantage was principally derived from the warm water, &c. At other times, I have stimulated the part affected with electricity, insulating the patient, and drawing sparks from the tumour, until a slight degree of inflammation was excited. After the application of the steam, or the use of the electrical machine, I have sometimes rubbed a little of the unguentum mercuriale into the tumour, and neighbouring parts, or applied the emplastrum saponaceum, or mercuriale cum ammoniaco, over the swelling, or a liniment with camphor, ol. olivarum, and sp. terebinth." Mr. White adds, that in such cases, if the tumours should suppurate, and burst, the parts will, in most instances, heal without much trouble. For eruptions on the head, he recommends applying the ung. saturn. album camphoratum, or the cerat. alb. cum hydrarg. præcip. alb. For the roughness of the skin, which is generally followed by eruptions, he also advises the aqua-vegeto-mineralis, aqua calcis, solutions of sal. tartar. or of the hydrarg. mur. as outward applications. "This last (says Mr White) will seldom fail to check the progress of the complaint, and dry the sores; and in the quantity of ten or twelve grains, to a quart of warm water, the use of it will not be productive of any pain. If the eruption should ulcerate, and require any unctuous application, to prevent the adhesion of the linen, the ointment beforementioned may be applied; the best remedy will be warm-bathing, and when practicable, the sea-water claims a preference." (*P.* 114.) The author next mentions his having occasionally recommended the vinum antimoniale, tartarum emeticum, decoctum Lusitanicum, decoctum lignorum, or sarsaparillæ; and that he sometimes found advantage derived from artificial drains. We need not detail this gentleman's mode of treating affections of the eyelids, as notice is taken of scrofulous diseases of the eye and eyelids, in the articles *Ophthalmy* and *Psorophthalmy.*

For the cure of indurations in the breast, remaining after mammary abscesses, Mr. White speaks very highly of the effects of the steam of warm water; and cautions us against indiscriminately employing calomel, which will often affect the mother little, but the child violently. Mr. White mentions his employing a small tin machine, large enough to hold a pint and a half, or two pints of boiling water. From the top proceeded a narrow tube, ten, or twelve inches long, through which the steam passed. Near its end, which was moveable and curved, was a joint, for the greater convenience of directing the steam to the diseased parts. The water was easily kept boiling, by means of a lamp under the machine. Mr. White says, that the steam should be employed twice, or thrice a day, and a piece of flannel, or skin, afterward applied. The body should also be kept open. In obstinate, neglected cases, mercurial preparations, according to Mr. White, must likewise be given, and, if they affect the child much, sucking should be suspended. (*P.* 117, 118.)

Mr. White speaks largely of the treatment of cases, in which the mesenteric glands are diseased; but, this subject strictly belongs to the physician. When, in these instances, the glands of the neck, or other parts of the body, tend to a state of suppuration, it is very slowly, the skin appearing uniformly thin, and of a deep red colour, and the tumour seeming flaccid. In such cases, Mr. White recommends the use of the lancet or caustic; for if no artificial opening is made, it will be a long time before the skin gives way; and when it does, the aperture will not only be very small, but often unfavourable in its situation. Mr. White adds, that the contents will often be more like mucus than pus, or like a mixture of both; and the discharge will continue for a great length of time, if no remedy is applied. This gentleman mentions his having found a solution of gum myrrhæ in aqua calcis, used as a lotion, and the ceratum saponaceum, or some similar outward application, the best method of treating this symptom.

We need not describe Mr. White's practice in the treatment of scrofulous joints, as the subject is fully considered in the article *Joints.* It appears, however, that he confirms the efficacy of stimulating applications, and pressure with bandages, when the fingers and toes are affected with strumous disease. (*P.* 143.)

Whoever compares the practice of Mr. White in administering calomel, occasional purgatives, the decoctum Lusitanicum sarsaparilla, &c. with the blue-pill, sarsaparilla, and laxative treatment of the present day, will perceive no very material difference between them, especially when the stress, which Mr. White laid upon attention to diet, clothing, &c. is taken into the account. Mr. Lloyd, who has detailed Mr. Abernethy's practice in scrofula, lays it down as an axiom, that "the disease is only to be cured by avoiding all sources of irritation, and restoring the natural and healthy functions of the digestive organs." (*P.* 48.) By sources of irritation, Mr. Lloyd means exciting causes; the advice is therefore excellent, as far as it can be followed, or such causes are decidedly known. The restoration of the functions of the digestive organs is also a thing worth aiming at, and the only difference in my views from those of Mr. Lloyd is, that as I look upon the disorder of the digestive organs to be in general only a complication, or effect of the scrofulous disease, ulcer, abscess, diseased joint, &c. and not the exciting cause, the treatment, when beneficial, becoming so only on the principle of improving the general health, by the removal or diminution of one of the most hurtful consequences of the original disease. It is hardly necessary to inform the profession, that the treatment, described by Mr. Lloyd, in addition to the usual advice about diet, clothing, the avoidance of damp and cold, and the utility of good air, exercise, &c. consists in giving the patient five grains of the pil. hydrarg. every night, and half a pint of decoct. sarsap. c. twice a day. And, if at a certain hour of the day, there has been no motion, recourse is had to opening medicines. This plan is pursued, till the bowels become regular; and then, with the view of preventing a relapse of the bowels into their former state, Mr. Lloyd continues the exhibition of alterative doses of mercury for an indefinite time, the preference being given to the compound calomel pill, in doses of five grains every night. In children, the practice is exactly like that of Mr. White, viz. small doses of calomel with purgatives. When acidity prevails in the stomach, small doses of soda are commended; and when the stomach is weak, with loss of appetite, cinchona, steel, and mineral acids. A full diet, with porter and wine, is disapproved of, and, as already stated, not much confidence is placed in sea-bathing. (*Lloyd on Scrofula, p.* 38.)

Crawford, Pinel, and others, have tried the muriated barytes, as a remedy in scrofulous cases. (*Med. Communications, Vol.* 2. *Nosogr. Philosophique, Vol.* 2. *p.* 238.) It has the recommendation of the celebrated Hufeland. Mr. Burns says, that the muriate of barytes has no effect on diseased glands; but that it is occasionally serviceable in scrofulous ulceration, though he adds that it deserves little dependence. (*Dissert. on Inflam. Vol.* 2, *p.* 372.) This gentleman recommends the following formula: ℞. Terræ Ponder. Salit. Chryst. gr. x. Aq. Font. Aq. Cassiæ, utriusque, ℥iij. Syrup. Aurent. ℥ij. Half an ounce of this may be given at first twice or three times a day, and gradually increased to such quantity, as the stomach can bear without sickness. At present few practitioners have any faith in the antiscrofulous virtues of the muriate of barytes; and, as Dr. Thomson remarks, it has had a much shorter-lived reputation than sea-water, or its successor the muriate of lime. (See *Lectures on Inflammation, p.* 196.)

Fourcroy proposed trying the muriate of lime; but its efficacy is very doubtful, and inconsiderable. "Professor Thomson (says Mr. Russell) has favoured me with the following observations on the effects of muriate of lime. He employed muriate of lime in various cases of scrofula, without having derived benefit from it in a single instance. Some patients, indeed, he admits, got well, while under a course of muriate of lime; but then he had no reason to ascribe the cure to the effect of the medicine. In other cases, on the contrary, the muriate of lime produced severe sickness and oppression at the stomach, and the patients got daily worse, till the muriate of lime was intermitted, and other medicines employed. The relief experienced from the intermission of the muriate of lime, left no doubt with regard to the injurious effects which the use of it had produced; and from extensive experience and accurate observation on the subject, Professor Thomson is satisfied, that muriate of lime is attended with prejudicial effects in many cases of scrofula." (See *Russell's Treatise on Scrofula.*) Since the publication of the last edition of this Dictionary, I have seen the muriate of lime given in several cases of scrofula; but without any beneficial effect on the disease. How long the muriate of lime will be permitted to enjoy its present fame, Dr. Thomson will not venture to say; but from what he has seen of its use, he imagines its reputation will only last, till some other new remedy is proposed by those, who are still sanguine in their hopes of discovering a specific for scrofula. (*Lectures, &c. p.* 196.) Iron, given either alone, or joined with the fixed, or volatile alkali, also deserves very little confidence. Burnt sponge, millipedes, and sulphate of potassa, have all been extensively tried; the first of these is, in my opinion, sometimes useful in diminishing enlarged scrofulous glands; and that it has this effect on bronchoceles, is indisputable.

The Marischal de Rougeres employed a remedy composed of iron filings, muriate of ammonia, subcarbonate of potassa, &c. (*Journ. de Med. tom.* 40, *p.* 219.)

Several narcotics have been tried, such as opium, hyoscyamus, the solanum dulcamara, &c.; but, though their virtues against scrofula have been sometimes cried up very highly, the moderns have lost all faith in them. The attention of the public to the effects of cicuta, in cases of cancer and scrofula, was first particularly excited by the accounts of its virtues published by Baron Stork.

Fothergill also praises cicuta, and perhaps it is as good an internal medicine as can be tried; but it is far from being generally efficacious. It is highly deserving of recommendation for irritable scrofulous ulcers. There is now not the least doubt, however, that the statements of Baron Stork are greatly exaggerated. He considered cicuta indicated, whenever obstructions and tumours existed; and, under this treatment, he says that he found the swellings melt away like ice. What is extraordinary, every sort of tumour yielded to cicuta. But, (as Dr. Thomson judiciously remarks) universal success is always one of the most suspicious circumstances, which can be mentioned in the history of the effects produced by any new remedy. (*Lectures, &c. p.* 199.) Dr. Cullen frequently employed hemlock, and sometimes found it useful in discussing obstinate swellings; but, he says, it also frequently disappointed him, and he never saw it dispose scrofulous ulcers to heal.

With regard to mercury, we have already noticed, that calomel was much employed by Mr. White. Some have exhibited the sublimate: others the acetite of mercury. All these preparations have been at times conjoined with cicuta, antimony, &c. Calomel is, perhaps, the best mercurial preparation in scrofulous cases; but mercury, given internally with any view of exciting a salivation, is justly deemed hurtful by all the best practitioners. As an alterative, and an occasional purgative, it is undoubtedly a good medicine for strumous patients. Mercury was much disapproved of by the celebrated Cullen, as a medicine for scrofula. As a distinguished Professor observes: "From the great apparent similarity of the symptoms, progress, and seats of scrofula, to those of syphilis, and from the well-known effects of mercury in curing syphilis, it need not seem strange, that medical men should have been a little obstinate in their attempts to obtain benefit from the use of mercury in scrofula. These expectations are in general abandoned, and mercury is now given for the cure of scrofula as a purgative only. A long-continued, or improperly-administered course of this medicine, has often been known to aggravate all the symptoms of scrofula; and, in many instances, to excite these symptoms in persons, in whom they did not previously exist." (See *Thomson's Lectures on Inflammation, p.* 194, 195.)

Mr. Burns thinks the nitrous acid has some effect in promoting the suppuration of scrofulous glands and tumours, and disposing ulcers to heal. He says, two or three drams may be given every day, for a fortnight; but if in this time it should do no good, its employment ought to be discontinued. The mineral acids, diluted with water, (says Professor Thomson,) are often used with views similar to those, which guide us in the employment of tonic remedies. Their medicinal powers appear to be nearly the same; but the nitric acid has of late been preferred, particularly in the scrofulous affections, which are sometimes induced by the action of mercury. (*Lectures, &c. p.* 197.)

The pills containing carbonate of soda, (see *Pilulæ*,) and the different soda waters, sold at the shops, have repute, for their good effects on scrofulous constitutions and diseases. A spirituous infusion of gentian, into six ounces of which are put thirty-six grains, of the carbonate of soda, or the same quantity of the carbonate of ammonia, is a medicine highly spoken of by Richerand for scrofulous cases. (*Nosogr. Chir. T.* 1, *p.* 184, *Ed.* 4.)

Potassa in large doses, with mercurial frictions, is the practice lately extolled by Mr. Farr; but it appears to me, that mercury and potassa had been repeatedly tried, long before this author delivered his sentiments to the public; and that such practice cannot be entitled to be called a method for the eradication of the disease. (See *Farr on Scrofula, 8vo. Lond.* 1820.)

According to Mr. Burns, eight or ten drops of hydrosulphuret of ammonia, given thrice a day, are useful in irritable strumous ulcers. The breathing of oxygen gas has been proposed; but of this plan I know nothing from experience, and, as it now makes less noise in the world than formerly, I conclude that either its usefulness has been exaggerated, or the difficulty of the practice is too great to allow of its extensive adoption.

The sentiments of Dr. Cullen are decidedly against antimony. As a modern writer observes, no great dependence seems ever to have been placed in the use of diaphoretic medicines for the cure of scrofula. The different preparations of antimony, indeed, have been occasionally administered; but chiefly in cutaneous affections, supposed to be of a scrofulous nature. Guaiacum, sarsaparilla, sassafras, and mezereon, singly, and in combination, have all been supposed to be useful in the cure of scrofula; but they are now seldom given with this view, except in cases of scrofula combined with syphilis, or excited by the too free and injudicious use of mercury. (*Thomson's Lectures, &c. p.* 199.)

With respect to Alibert's practice, among the vegetable bitters, he prefers the hop, burdock, gentian, and bark. He seems to have no confidence in specifics, like hemlock, belladonna, aconitum, &c. Neither does he express himself favourably of alkaline medicines, the muriate of ammonia, and the muriate of barytes. However, he praises the good effects of steel medicines on enlarged glands. He affirms, that he has seen most good derived from external means; aromatic fumigations in an apparatus prepared by the chymist Darcet. What he calls scrofulous eruptions, he covers with a strong solution of the nitrate of silver. Swelled glands he rubs with the antimonial ointment. He commends also change of air, and the avoidance of low damp places; and speaks favourably of sea-bathing, sea voyages, sulphureous mineral waters, and particularly of the good effects derived from the solar warmth. (See *Nosol. Nat. p.* 449.)

The local treatment, preferred by Mr. White, has been already described. I have only a few words to add concerning this part of the subject. Dr. Cullen states, that, in his practice, he had very little success in discussing incipient scrofulous tumours by topical applications; and that a solution of the saccharum saturni, though sometimes useful, more frequently failed. Dr. Cullen found the aqua ammoniæ acet. not more successful. "Fomentations of every kind (says he) have been frequently found to do harm; and poultices seem only to hurry on a suppuration. I am doubtful if this last be ever practised with advantage; for scrofulous tumours sometimes spontaneously disappear, but never after any degree of inflammation has come upon them; and therefore, poultices, which commonly induce inflammation, prevent that discussion of tumours, which might otherwise have happened." Even when scrofulous tumours have advanced towards suppuration, Dr. Cullen thought, that hastening the spontaneous opening, or making one with a lancet, was hurtful.

With respect to ulcers, Dr. Cullen remarks, that escharotic preparations, of either mercury, or copper, have been sometimes useful in bringing on a proper suppuration, and thereby disposing the ulcers to heal; but they have seldom succeeded, and more commonly, they have caused the ulcer t spread more. The escharotic, from which Cullen saw most benefit result, is burnt alum, mixed with some mild ointment. But this celebrated writer gives the preference to keeping the sores continually covered with linen wet with cold water in the daytime, and some ointment or plaster at night. Cullen says, that he usually found sea-water too irritating, and no mineral water better than common water. (*First Lines of the Pract. of Physic, Vol.* 4.)

Formerly, the extirpation of scrofulous tumours was advised; but this method is now considered as being, for the most part, injudicious and unnecessary, with the exception of diseased joints, and a few other parts, which frequently require being amputated for the sake of saving the patient's life. Certainly, no particular danger (generally speaking) would attend cutting out scrofulous glands and tumours; the objections to the plan are founded on the pain of the operation; on the number of such glands frequently diseased; on their often subsiding, either spontaneously, or by surgical treatment; on the operation doing no good to the general affection of the system, &c. When, however, a scrofulous testicle, breast, or joint, seriously impairs the health, and endangers life, the very existence of the patient demands the immediate removal of the diseased part. Wiseman relates, that he was in the habit of cutting out scrofulous glands and tumours with great success; but for reasons already alleged, most of the moderns think such operations in general at least unnecessary.

Caustics have been employed for the same purpose, instead of the knife; but, as they effect the object in view less certainly, more painfully and tediously, and cause extensive ulcers, they are disused by all the best surgeons of the present day.

Some authors have advised making issues, and keeping them open, in order to prevent any ill effects from healing scrofulous ulcers. Issues are certainly quite unnecessary for any purpose of this kind; but they are eminently useful as a part of the local treatment of scrofulous joints and abscesses, as we have more particularly explained in the articles *Joints*, *Lumbar Abscess*, and *Vertebræ*.

Mr. Burns notices, that issues have hitherto been chiefly used in diseases of the bones and joints; but he adds, that it is reasonable to suppose that they ought likewise to be useful in the cure of enlargements of the glands, and other scrofulous tumours, if inserted in the immediate vicinity of the part. The only objection to their use is the scar which they leave, and which, in certain situations, one would particularly wish to avoid. When the tumour is thickly covered with the integuments, the issue may be made directly over it, and kept open with the savine ointment. In other cases, a small pea issue or seton may be inserted by the side of the tumour. This method would be objectionable, for scrofulous glands in the neck, in consequence of the scar; but it might be employed when the mamma is diseased. (*Dissertations on Inflammation, Vol.* 2.) The late Mr. Crowther used to apply blisters to scrofulous swellings, and maintain a discharge from the part. And a more modern practice is that of producing irritation of the integuments, covering tumours and abscesses, by means of the tartar emetic ointment. (*Alibert Nosol. Naturelle, p.* 449; *Goodlad on Diseases of the Absorbents, p.* 162, *&c.*)

Preparations of lead; cloths dipped in cold water, sea-water, or weak vegetable acids; æther; sea-salt mixed with bile; the linimentum camphoræ; a mixture of æther and the linimentum opiatum; and hemlock poultices; form a long list of applications, which have been employed for scrofulous tumours.

According to Mr. Burns, moderate pressure, by means of adhesive plaster, conjoined with the application of cold water, is one of the best plans of treating mild scrofulous ulcers, when their situation admits of it. In other cases, he recommends applying a powder, five parts of which consist of cerussa acetata, and the sixth of burnt alum. A piece of dry lint is next to be applied, and a compress, with such pressure as can be used. Benefit occasionally results from dipping the compress in cold water.

The ceratum è lapid. calamin. is a good common dressing, when it is wished not to interfere much with the progress of the ulcer. The ung. hydrarg. nitrat. rub. and the ung. hydrarg. nitrat. are the best stimulating ointments. Poultices of bread and sea-water; solutions of alum, cuprum vitriolatum, and the hydrarg. mur.; solutions of the nitrates of copper, bismuth, and silver; the recent leaves of the wood-sorrel bruised; lint dipped in lemon-juice, or vinegar and water; are among the applications to common scrofulous ulcers.

For irritable sores, diluted hydrosulphuret of ammonia; ointments containing opium; carrot and hemlock poultices; a solution of opium; and carbonic acid gas; are commonly recommended.

The following are Mr. Russell's sentiments respecting the treatment of scrofulous ulcers: "Scrofulous complaints in general do not agree well with stimulant applications. In the treatment of scrofulous ulcers, under the ordinary circumstances of complaint, the simplest and mildest dressings answer best. When the patients are using a course of sea-bathing, it is usual to wash the sores with sea-water, over and above the momentary application of the sea-water during the immersion of the whole body. Cold spring-water is likewise a favourite application with many practitioners; and from much observation, it appears that the operation of cold is well suited to counteract the state of inflammation, which accompanies scrofulous sores. Preparations of lead are, upon the whole, very convenient and useful applications, provided the solutions be used in a state of sufficient dilution to prevent irritation. Liquid applications are applied by means of wet linen, which is renewed whenever it dries, so that the surface of the sore may be kept constantly moist when under this course of management. Upon the same principle, simple ointment and Goulard's cerate, furnish the best dressing in ordinary cases.

"Scrofulous congestions, of a solid nature, in the more external parts of the body, are little adapted to the practice of local bleeding, unless they be attended with symptoms of inflammation; but as some degree of inflammation is, in general, present during the incipient stage, it may be prudent to employ local bleeding in moderation at the commencement of the attack, although there may be no indication to persist in the practice, after the complaint has advanced farther in its progress. If, however, these congestions are more of an indolent nature, unaccompanied with heat or pain, there is no benefit to be expected from the local detraction of blood; warm fomentations, together with the use of stimulants, and a repetition of blisters, are the most serviceable class of remedies: such cases, too, are the best adapted to the use of friction as a discutient. Friction, indeed, has long been employed for this purpose; but, of late years, it has been introduced to an extent, and with an effect, far beyond the experience of all former practice. As yet it has been circumscribed to the practice of a very few individuals, with whom it is said to have performed very great cures; and if, upon the test of more extensive experience, it is found to answer its present high character, I shall consider the use of repeated frictions to be one of the most valuable improvements which has been introduced into practice in modern times. The safety and simplicity of the practice recommend it very strongly to favour, though I am afraid they are the very circumstances which retard its adoption by the public in general. I only regret that I do not feel myself entitled to give a decided opinion upon the subject from my own experience, though I have known some instances of successful cures; but the reports of success are so numerous and so well supported, that I am inclined to think very favourably of the practice.

"There is no substance interposed between the surface of the swelling and the hand of the person who administers the friction, excepting a little flour, to prevent the abrasion of the skin. The friction is applied regularly two or three hours every day, with great celerity, the hand being made to move to and fro one hundred and twenty times in a minute, and the course may require to be continued, without interruption, for some months." (See *Russell on Scrofulæ.*)

I shall not enlarge upon this endless subject, which still stands in need of elucidation as much as any disease that can be instanced. The scrofulous affections of the joints are explained in *Joints*; *Bronchocele*; *Lumbar Abscess*; *Spina bifida*; and *Vertebræ*, are other articles, containing matter connected with the preceding observations.

The reader may consult *Wiseman's Chirurgical Treatises. J. Brown, Adenochoiradelogia, or an anatomick-chirurgical Treatise of Glandules and Strumals, or King's Evil Swellings, together with the Royal Gift of Healing, or Cure thereof by contact, or imposition of hands, &c.* 8vo. *Lond.* 1684. *Wm. Clowes, A right frutefull and approved Treatise, for the Artificial Cure of the Struma, or Evil, cured by Kings and Queens of England,* 4to. *Lond.* 1602. *Cullen's First Lines of the Practice of Physic, Vol.* 4. *Ferne on the King's Evil. Cheyne on the King's Evil. R. Russell, A Dissertation on the Use of Sea-Water in the Diseases of the Glands, &c.* 8vo. *Lond.* 1769. *B. Bell's Surgery, Vol.* 5. *B. Bell on Ulcers. Tumor Strumosus Colli post vomitorium imminutus.* 8vo. (*Weikard, Collect.* 88.) *Kirkland's Medical Surgery, Vol.* 2. *J. Morley, Essay on the Nature and Cure of Scrofulous Disorders, &c. New Ed.* 8vo. *Lond.* 1778. *White on the Struma, Edit.* 2, 1794. *P. Lalonette, Traité des Scrophules, &c. Paris,* 1780. *A. G. Kortum's Comment. de Vitio Scrophuloso, in* 2 *Vol.* 4to. *Lemgoviæ,* 1789. *R. Hamilton, Observations on Scrofulous Affection, &c.* 8vo. *Lond.* 1791. *London Med. Obs and Inq. Vol.* 1. *S. T. Soemmerring, De Morbis Vasorum Absorbentium Corporis Humani.* 8vo. *Traj.* 1795. *C. W. Hufeland, Ueber die Natur, &c. der Skrophelkrankheit.* 8vo. *Jena,* 1795. *Dissertations on Inflammation, by John Burns, Vol.* 2. *M. Underwood, Treatise upon Ulcers, &c. with Hints on a Successful Method of treating some Scrofulous Tumours, &c.* 8vo. *Lond.* 1785. *Crowther's Obs. on the Disease of the Joints, commonly called White Swelling; with remarks on Caries, Necrosis, and Scrofulous Abscesses, &c. Edit.* 2, 1808. *A Treatise on Scrofula, by James Russell,* 8vo. *Edinburgh,* 1808. *Lectures on Inflammation, by John Thomson, M. D. p.* 130, *et seq. p.* 155—191, *&c. Edinb.* 1813. *This work contains as good and as rational an account of the subject as any book which I have examined. Wm. Goodlad, A Practical Essay on the Diseases of the Vessels and Glands of the Absorbent System,* 8vo. *Lond.* 1814. *G. Henning, A Critical Inquiry into the Pathology of Scrofula,* 8vo. *Lond.* 1815. *Richerand, Nosographie Chir. T.* 1, *p.* 165, *et seq. Edit.* 4. *Delpech, Précis Elémentaire des Maladies, Chir. T.* 3, *p.* 617, *&c. Paris,* 1816. *Lassus, Pathologie Chir. T.* 2, *p.* 383, *&c. Edit.* 1809. *Callisen, Systema Chirurgiæ Hodiernæ, Vol.* 2, *p.* 113, *Hafniæ,* 1800. *Boyer, Traité des Maladies Chir. T.* 2, *p.* 414, *&c. Paris,* 1814. *Ch. Brown, Treatise on Scrofulous Diseases, showing the good Effects of factitious Airs.* 8vo. *Lond.* 1798. *Baume, Traité sur le vice Scrophuleux,* 8vo. *Paris,* 1808. *J. Brandish, Obs. on the use of caustic alkali in Scrofula, and other chronic Diseases,* 8vo. *Lond.* 1811. *C. Armstrong, Essay on Scrofula, in which an account of the Effects of the Carbonas Ammoniæ is submitted to the Profession,* 8vo. *Lond.* 1812. *W. Lambe, Inquiry into the origin, &c. of Constitutional Disorders, particularly Scro-*

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SCROTOCE'LE. (from *scrotum*, and κηλη, a tumour.) A rupture or hernia in the scrotum.

SCROTUM, CANCER OF. (*Chimney-sweeper's Cancer. The soot-wart.*) Mr. Pott gives the following account of this peculiar disorder.

"It is a disease which always makes its first attack on, and its first appearance in, the inferior part of the scrotum; where it produces a superficial painful, ragged, ill-looking sore, with hard and rising edges; the trade call it the soot-wart. I never saw it under the age of puberty, which is, I suppose, one reason why it is generally taken, both by patient and surgeon, for venereal, and being treated with mercurials, is thereby soon and much exasperated: in no great length of time, it pervades the skin, dartos, and membranes of the scrotum, and seizes the testicle, which it enlarges, hardens, and renders truly and thoroughly distempered; from whence it makes its way up the spermatic process into the abdomen, most frequently indurating and spoiling the inguinal glands: when arrived within the abdomen, it affects some of the viscera, and then very soon becomes painfully destructive.

"Other people, besides chimney-sweepers, (says Pott) have cancers of the same part; and so have others, besides lead-workers, the Poictou colic, and the consequent paralysis; but it is nevertheless a disease to which they are peculiarly liable; and so are chimney-sweepers to the cancer of the scrotum and testicles.

"If there be any chance of putting a stop to, or preventing this mischief, it must be by the immediate removal of the part affected; I mean that part of the scrotum where the sore is: for if it be suffered to remain until the virus has seized the testicle, it is generally too late even for castration. I have many times made the experiment; but though the sores, after such operation, have, in some instances, healed kindly, and the patients have gone from the hospital seemingly well, yet, in the space of a few months, it has generally happened that they have returned, either with the same disease in the other testicle, or in the glands of the groin, or with such wan complexions, such pale leaden countenances, such a total loss of strength, and such frequent and acute internal pains, as have sufficiently proved a diseased state of some of the viscera, and which have soon been followed by a painful death.

"If extirpation ever bids fair for the cure of a cancer, it seems to be in this case; but then the operation should be immediate, and before the habit is tainted. The disease, in these people, seems to derive its origin from a lodgment of soot in the rugæ of the scrotum, and at first not to be a disease of the habit. In other cases of a cancerous nature, in which the habit is too frequently concerned, we have not often so fair a prospect of success by the removal of the distempered part; and are obliged to be content with means which I wish I could say were truly palliative; but here the subjects are young, in general in good health, at least at first; the disease brought on them by their occupation, and in all probability local; which last circumstance may, I think, be fairly presumed from its always seizing the same part: all this makes it (at first) a very different case from a cancer which appears in an elderly man, whose fluids are become acrimonious from time, as well as other causes; or from the same kind of complaint in women who have ceased to menstruate. But be all this as it may, the scrotum is no vital organ, nor can the loss of a part of it ever be attended with any, the smallest degree of inconvenience; and if life can be preserved by the removal of all that portion that is distempered, it will be a very good and easy composition; for when the disease has got head, it is rapid in its progress, painful in all its attacks, and most certainly destructive in its event." (*Pott's Works, Vol.* 3. See *also W. Simmons's Cases and Obs. on Lithotomy, to which are added Obs. on Chimney-sweeper's Cancer,* 8*vo. Manchester,* 1808.)

SCROTUM. *Sarcomatous Thickening and Enlargement of.* The investigations of Baron Larrey lead him to believe, that cases of enormous growth of the scrotum are endemial in warm countries, or, at least, that they are seldom observed in cold climates; since most of the examples which have been seen in Europe came from Asia and Africa. The scrotal tumour of Delacroix, formerly minister of external relations, says Larrey, is perhaps the only well-authenticated instance of the origin of such a disease in our own climate; and it was also much smaller than the instances related in the Ephemerides German. for the year 1692, in the surgical writings of Dionis, in the 9th vol. of the Bibliothéque de Médecine, and those which Larrey was surprised to meet with in Egypt. The smallest of these latter, after they had attained their full size, weighed more than 25 kilograms (between 60 and 70 pounds.)

Several cases of this curious disease are recorded by other writers, particularly by Dr. Cheston, Dr. Titley, and the celebrated Sandifort. I lately saw in Mr. Abernethy's museum, a considerable fleshy substance, which was a portion of diseased scrotum.

In the cases which Larrey had an opportunity of seeing in Egypt, the fleshy mass, into which the scrotum was converted, was broad below, and suspended from the pubes by a sort of pedicle. "Externally, (as Larrey observes) the tumour presents rugosities of different sizes, separated by particular lines or sinuses, to which the mucous cryptæ and roots of the hairs correspond. Upon a large portion of its surface, especially when the case is of long standing, yellowish scaly crusts are always seen, the detachment of which constantly leaves so many small herpetic ulcers, which emit an ichorous discharge. The tumour is indolent and hard at some points, but softish at others. It may be handled, and pressed in different directions, without the least pain. The patient is only incommoded by its weight, and the impediment which it causes to his walking well. Hence he is necessitated to employ a suspensory bandage. In consequence of the situation of the urethra, the urine dribbles over the swelling; but without causing any excoriation." In most of the cases seen by Larrey, the spermatic chord and testicles were in the natural state, situated at the sides and at the root of the swelling. The spermatic vessels, however, are somewhat enlarged and elongated. All the patients were likewise more or less affected with elephantiasis.

Baron Larrey attempts to explain the causes of the complaint in Egypt, but, as I think, without any degree of success. As the affection is seldom seen in old countries, climate has certainly a chief effect. Employments which keep persons a good deal in a sitting posture; the loose breeches worn by the Egyptians, and the consequently pendulous state of the scrotum; diseases of the humours, and particularly itchy pustules on the part, an ordinary consequence of syphilis in that country; bad regimen; abuse of venery; and the immoderate use of the warm bath; are merely conjectures, which will not bear the test of reasoning.

The enormous magnitude, which this sort of disease may attain, is almost incredible. The case, recorded in the Ephemerides German, weighed about a hundred kilograms, or more than two hundred weight. Another, described by Larrey, was calculated to weigh about one hundred and twenty pounds, and this surgeon likewise saw in Egypt ten or twelve more instances, nearly as large, and all of the same character.

A very curious example, in which a similar disease affected the labia pudendi in a surprising degree, is also detailed by Larrey. The woman was a native of Cairo.

In the early stage of the disorder, we may try preparations of antimony combined with sudorifics; drinks acidulated with sulphuric acid, lotions containing the same acid, or the oxymuriate of mercury, the oxyde of copper, or the muriate of ammonia. These means are to be assisted by a gradual, uniform compression of the whole tumour. In one case, incisions and the application of caustic, proved of no service, and Larrey very properly condemns such experiments.

When the disease resists every plan tried for its relief, and its increase renders the patient's life irksome, and wretched, the extirpation of the tumour with a knife becomes proper. In this proceeding, the chief skill consists in doing no injury to the spermatic chords and testicles, which are generally perfectly sound. As the substance of the swelling is not furnished with large vessels, the hemorrhage need not be feared. Care must also be taken not to injure the corpora cavernosa penis, and the urethra. After the operation, the skin is to be brought over the exposed testicles, as much as possible, with adhesive plaster and a bandage.

M. Delonnes successfully removed the diseased mass in the celebrated case of the French minister Delacroix, and Larrey performed the same operation with success, when he was in Egypt. Dr. Titley, of the island of St. Christopher, also cut away such a tumour, which weighed seventy pounds, and the patient, who was a negro, and also affected with elephantiasis, speedily recovered. (See *Medico-Chirurgical Trans. Vol.* 6, *p.* 73, *&c.*)

It is probable, that some of the cases, which occur in warm countries, are analogous to the elephantiasis; but I do not believe, that the scaly incrustations, which are represented by Larrey as occurring in the cases which he saw in Egypt, have been always noticed in the instances which have taken place in colder countries. Nor, indeed, did they take place in the instance recorded by Dr. Titley, the surface of the tumour having been quite smooth. (*Larrey, Mémoires de Chirurgie Militaire, T.* 2, *p.* 110, *et seq. Richerand Nosographie Chir. T.* 4, *p.* 314, *&c. Edit.* 4. *Also Delonnes' Memoir. Dr. Cheston's Case, &c. Med. Chir. Trans. Vol.* 6.)

SEARCHING. The operation of introducing a metallic instrument, through the urethra into the bladder, for the purpose of ascertaining whether the patient has a stone or not. See *Sounding.*

SETON. (*Setaceum,* from *seta,* a bristle, because horse-hairs were formerly used for keeping open the wound.) A kind of issue. It is usually made by means of a particular needle, which is of various breadths, from half an inch to a full inch. The needle is commonly a little curved, but, if straight, it would be better calculated for the purpose. From the point to its broadest part, it is double edged, and behind it has a transverse eye, through which a skein of thread or silk, of exactly the same breadth as the needle, is placed.

A fold of skin is to be pinched up at the part where the seton is designed to be made, and the needle is to be pushed through it, together with the skein of thread, which is first dipped in sweet oil. The instrument is not to be introduced too low into the base of the fold, nor too high, near its edge. In the first case, the muscles, and parts which ought to be avoided, might be wounded; in the second, the interspace between the two wounds would be very narrow, and the seton soon make its way through it.

When no seton needle is at hand, the fold of the skin may be punctured with a lancet, and the skein of thread introduced by means of an eye-probe. A seton may be applied almost to any part of the surface of the body, when circumstances require it; but one of its openings should always be made lower than the other that the matter may readily flow out. The skein of thread is to remain untouched for a few days after the operation, until the suppuration loosens it. Afterward the part of the thread nearest the wound is to be smeared with oil, white cerate, or any digestive ointment, and drawn under the fleshy interspace between the two wounds, and what was there before is to be cut off. The seton is to be drawn in this manner once or twice a day, according as the quantity of matter may require. A new skein of silk, or thread, is to be attached to the preceding one, as often as necessary. Care is to be taken to keep the thread on the outside of the wound well covered, and free from the discharge, which would make it stiff and hard, and apt to occasion pain and bleeding on being drawn into the wound. If the discharge should be deficient in quantity, powdered cantharides may be mixed with the digestive ointment.

SHINGLES. See *Herpes.*

SIGHT, DEFECT OF. There are persons, who, from their infancy, are incapable of distinguishing one colour from another. A man who was affected with this infirmity, could not distinguish green at all. Green and red appeared to him the same. Yellow and blue he could discern very well. With regard to dark-red and dark-blue, he frequently made mistakes. In other respects, his vision was sound and acute. The father of this patient was afflicted with the same infirmity. The mother and one sister were free from it. Another sister and two of her children had it. The patient himself had two children, who did not labour under the disorder. (See *Phil. Trans. Vol.* 68, *Part* 2.) Another subject, whose eyes were in other respects healthy, and whose eyesight was sharp, could not distinguish a dark-green from a dark-red.

An interesting example of this curious imperfection of vision has lately been published by Dr. Nicholl, of Cowbridge. (See *Med. Chir. Trans. Vol.* 7, *p.* 477, *&c.*) The subject was a healthy boy, eleven years of age, whose eyes were gray, with a yellow tinge surrounding the pupil. He never called any colour green. Dark bottled green he called brown. He could distinguish light yellow; but darker yellows and light browns he confounded with red. Dark brown he mistook for black. Pale green he called light red; common green he termed red. Light red and pink he called light blue. Red he called by its proper name. He could distinguish blue, both dark and light. On the mother's side the boy had some relations whose sight was similarly affected. An interesting chapter on what is termed *coloured vision*, may be read in a modern valuable work, to which I have great pleasure in referring. (See *Wardrop's Essays on the Morbid Anatomy of the Human Eye, Vol.* 2, *p.* 196. *8vo. Lond.* 1818.)

Sometimes objects appear to the eye to be of a different colour from what they really are, not because there is any thing wrong in the eye itself, but in consequence of the unclear and coloured light by which the object is illuminated. Thus, for instance, a bad tallow candle, which emits a yellow flame, makes every thing appear yellow. When brandy is burning, all objects appear blue. In short, it is only by the light of the sun, that any object can be seen in its clear natural hue. In certain cases, the infirmity is owing to the transparent parts and humours of the eye, which do not happen to be of a proper colour. Thus, persons having the jaundice in a high degree, see all things yellow, because the transparent parts of the eye are of that colour. When, in consequence of external violence applied to the eye, blood is effused, and the aqueous humour rendered red by this fluid, all objects seem to the patient to be red; and white, when the aqueous humour has been made of this colour by the couching of a milky cataract. Sometimes this defect in vision is ascribable to the duration of an impression. When one has surveyed a bright-coloured object a long while, as, for example, a bright red or yellow wall, on which the sun shines, that colour will often remain a good while before the eyes, although one may not be looking any more at an object of this hue. There are some eyes, which seem much disposed to retain the impression of objects, which are not very bright coloured; but, such a disposition always betrays great weakness and irritability of those organs. The most frequent cause of this defect in vision, is an irritation operating upon the optic nerves, so as to produce the irritability in them, which alone makes objects appear of one colour. The seat of such irritation, according to Richter, is also most commonly in the abdominal viscera, and the case demands evacuations, tonics, and anodyne medicines. But, the disorder may also originate from other causes. The operation of bright-coloured or shining objects upon the eye, sometimes has, for a certain time afterward, the effect of making objects of diverse colours appear to be moving before the eyes. In extreme terror, or fright, things may also seem to have a different colour from their real one. The same often happens in fevers attended with delirium. A sudden exposure of the head to cold, at a period when it was perspiring much, in one instance, caused many coloured appearances before the eyes; but, the disorder subsided in a couple of days. (*Richter, Anfangsgr. der Wundarzn. B.* 3, *p.* 523.)

Also a healthy eye sees a distant object with uncertainty, and error, in a room, or space, the extent, length, and breadth, of which are unknown, when the size of the object itself is unascertained, and when there are few or no other objects intervening at a smaller distance between the eye and the thing looked at. The more numerous the objects are between the eye and the principal thing looked at, the more distant it is made to appear; the fewer they are, the nearer it seems to be. In a country covered with snow, and upon the sea, very distant objects appear to be close. The smaller an object is to the eye, in relation to its known magnitude, the further off it seems. The errors which the eye makes, in regard to the distance of objects, also tend to deceive. But, there are certain cases, in which the eye is almost entirely incapable of judging of the distance of objects. The first is, when the object, of which we wish to ascertain the distance, is looked at with only one eye. Hence all one-eyed persons, and persons affected with strabismus, are unable to judge well of the real distance of objects. However, they are only so for a certain time; and by practice they gradually acquire the faculty. Even when two eyes are employed, it requires some exercise, in order to enable them to judge of the right distance of objects. Persons, born blind, but who have their sight restored in both eyes by the operation for the cataract, are a long while incapable of judging of distances, and only obtain this power very gradually. Lastly, this infirmity is sometimes owing to an irritation affecting the optic nerves, whereby their sensibility is so altered, that distant objects make the impression upon them of near ones. In this circumstance, all objects appear to the patient closer than they really are. This is the only case, which admits of being treated as a disease. The irritation, producing the disorder, is mostly seated in the abdominal viscera, and requires evacuations and such medicines as invigorate the nerves. A suppression of the perspiration is alleged to be sometimes a cause (*Richter, Anfangsgr. der Wundarzn. B.* 3, *p.* 525.)

A sound eye likewise does not always judge with accuracy and uniformity of the magnitude of objects. This may arise from three causes. In order to judge rightly of the size of any thing, its precise distance must be known; for the more remote it is, the smaller will it seem to the eye. Hence, any conjecture respecting the magnitude of an object is constantly erroneous, unless the distance be ascertained. Size is invariably something relative. A single large object, surrounded by many small ones, always appears to be larger than it really is, et vice versa. An object whose magnitude is known, seems smaller than it actually is, when one has been a little previously looking at another that is still larger. Lastly, the refraction of the rays of light in the eye, by which operation an object is made to appear large or small, is not always accomplished in the same degree, as the eye is not at all times equally full and distended with its humours. Hence, at one time, the same object will appear to the same eye, and at the same distance larger; at another time smaller. Sometimes, however, the eye judges so erroneously of the magnitude of objects, that there is reason for regarding the case as an infirmity, or disease. It is for the most part owing to a defective sensibility in the nerves, caused by some species of irritation acting upon the eye, and generally seated in the gastric organs. A man, to whom every thing seemed one half smaller and nearer than it really was, was cured by means of an emetic, bark, an issue and valerian. (*Leutin, obs. fascic.*)

Sometimes to the eye, under circumstances of disease, straight lines appear serpentine; perpendicular objects, sloping, things standing upright, to be inverted, &c. All these cases are set down by Richter as depending upon a wrong sensibility of the nerves, occasioned by the effect of some irritation. The irritation, he says, may be of many kinds; but experience proves that it is mostly seated in the gastric organs. These defects of sight may generally be cured by first exhibiting emetics and purgatives, and afterward having recourse to remedies for strengthening the nerves, bark, oleum animale, valerian, issues, &c. One mark of a very weak and irritable eye, is when objects, after being looked at a good while, and presenting a right appearance, begin to move, swim about, mix together, and, at length, become quite indistinguishable. This principally happens when the objects regarded are small and strongly illuminated. Here such remedies, both general and topical, as have the effect of invigorating the nerves, are indicated. However, sometimes, the infirmity is partly owing to the operation of some species of irritation, which will require removal, ere the tonic medicines and applications can avail. Indeed, in particular cases, the dispersion of such irritation is alone sufficient to accomplish the cure.

Sometimes, all objects appear to the eye, as if they were in a more or less dense mist. This defect in vision is always owing either to some slight opacity of one of the humours of the eye, or to excessive debility of the optic nerves. (See *Richter, Anfangsgr. der Wundarzn. B.* 3, *p.* 521, *&c.*)

SINUS.—A long, narrow, hollow track, leading from some abscess, diseased bone, &c.

SOLUTIO ARGENTI NITRATI.—℞. Argenti nitrati ℈j. Aq. distillat. ℥ss M. This is a very good application for sores, which are frequently met with round the roots of the nails, both of the fingers and toes. It is also useful in herpetic affections, noli-me-tangere, and several kinds of ulcers. The proportion of the argentum nitratum may be lessened, or increased, as occasion requires. A strong solution of this substance is a good application for destroying warts, to which it must be applied, by means of a hair-pencil. When used for sores, it is best to dip little bits of soft lint in it, lay them on the part affected, and cover them with a common pledget.

SOLUTIO FERRI SULPHATIS.—℞. Ferri sulphatis ad albidinem calcinati ʒj Aq. Distillat. ℥viij. Misce. Has been recommended as an application for sores on the nipple, and other ulcers.

SOUND. An instrument, which surgeons introduce through the urethra into the bladder, in order to discover, whether there is a stone in this viscus, or not. The sound is usually made of very highly polished steel, that it may be well calculated for conveying to the surgeon's fingers the sensation of any thing, against which its end may strike. It is also generally rather less curved, than a catheter, so that its extremity may be more easily inclined to the lower part of the bladder, where the stone is most frequently situated.

SOUNDING. The operation of introducing the foregoing instrument.

Sounds are generally introduced much in the same way as catheters, either with the concavity towards the abdomen, or the convexity, in which last method, it is necessary, as soon as the beak of the sound has arrived in the perineum, to bring the handle of the instrument downward by a semicircular movement to the right, while the other end is kept as much fixed as possible. This is what the French term the coup, or tour de maitre; a plan, that is often followed at the present day, though, except in very corpulent subjects, it has no particular recommendation.

When a patient is to be sounded, he is usually put into a posture very similar to that adopted in the lateral operation for the stone, with the exception that he is not bound in this position, as there is sometimes an advantage in making the patient stand up, in order that the stone may come into contact with the end of the sound. The instrument having been introduced, its extremity is to be turned, and moved in every direction, when if there be a calculus, its presence will usually be indicated by the collision against the beak of the sound.

Stones have sometimes been found in the bladder after death, although they could never be discovered with a sound while the patient was alive, suffering all the symptoms of the complaint. The celebrated French surgeon La Peyronie was thus circumstanced: he was so fully convinced of there being a stone in his bladder, notwithstanding neither he, nor any of his friends could feel it with a sound, that on his death-bed, he gave directions for ascertaining the fact. Hence, when the usual symptoms of a stone in the bladder continue, patients should be searched several times, before a positive opinion is delivered respecting the nature of the disease. When during the operation of sounding, all the urine has escaped from the bladder, the inner surface of this viscus comes into contact with the end of the sound, and such a sensation may be communicated to the surgeon's fingers as leads him to suspect that a fungus, or some other hardish extraneous substance is contained in the bladder. In such cases, patients have actually been cut for the stone, when no foreign body whatever was present. (See *Sabatier, Médecine Operatoire, Tom. 3, p.* 127, 128, *Edit.* 2. See *Lithotomy.*)

SPE'CULUM. An instrument intended for facilitating the examination of parts, and also the performance of operations on them: thus we have specula ani, specula oculi, auris, &c.

SPHA'CELUS. (from σφαζω, to destroy.) Surgeons imply, by this word, complete mortification, which is mostly preceded by a stage of the disorder, termed *gangrene.* See *Mortification.*

SPICA. (from σταχυς, an ear of corn.) A name, given to a kind of bandage, in consequence of its turns being thought to resemble the rows of an ear of corn.

In order to apply the spica bandage to the shoulder, the margins of the axillæ must first be protected from the effects of the pressure, by means of soft compresses, and the end of a common roller is then to be placed under the opposite arm-pit. After conveying the bandage backward, obliquely over the scapulæ, the surgeon is to bring it forward over the injured shoulder. The roller is next to descend under the arm-pit, then be carried upward again, and made to cross on the deltoid muscle. It is now to be carried obliquely over the front of the chest, and under the opposite arm-pit, where the end of it is to be pinned, or stitched. The bandage is next to pass across the back, over the part of the roller previously applied in this situation, and is to be conveyed round the head of the os brachii, so as to form a turn, or *doloire*, with the first circle of the roller. Three or four *doloires*, or turns, each of which covers about one-third of the preceding one, are to be made, and then the upper part of the arm is to be once surrounded with a plain circle of the bandage. This last circular application leaves between it and the cross previously made, a triangular equilateral space, technically named by writers *geranis.* The roller is now be to carried upward in a spiral manner; its head is to be brought to the opposite armpit, and the application of the whole concludes with a few turns round the body. The bandage is to be fastened with pins at the place where it commenced.

In applying the *spica inguinis*, the end of the roller is to be placed on the spine of the os ilium, of the affected side. The bandage is then to be carried obliquely over the groin, and under the perinæum. Then it is to pass over the back of the thigh, and next forward, so as to cross the part previously applied on the front of the groin. The application is continued by carrying the roller over the pubes, over the opposite os ilium, and next round the body above the buttocks. The bandage thus returns to the place where it began. Its application is completed by making a few turns, like the preceding ones, and lastly, a few circles round the body,

SPINA BIFIDA. (i. e. the Cloven Spine.) *Hydro-Rachitis.* A disease, attended with an incomplete state of some of the vertebræ, and a fluid swelling, which is most commonly situated over the lower lumbar vertebræ, sometimes over the dorsal and cervical ones, and in some instances, over the os sacrum. The same name has also been given to an analogous tumour, which sometimes occurs on children's heads, attended with an imperfect ossification of a part of the cranium. The malformation of the spine seems to consist in a deficiency of one or more of the spinous processes. Sometimes, indeed, these processes are wanting the whole length of the vertebral column, as was seen in the case reported by Fieliz. (See *Richter's Chir. Bibl. B.* 9, *p.* 185.)

The Arabians, who first treated of this disease, erroneously imputed the deficiency of one, or more of the spinons processes to the tumour, while it is well known, that the incomplete state of the affected vertebræ is a congenital malformation, and that the swelling is only an effect. In fact, the tumour generally becomes larger and larger, the longer it continues. The spina bifida may be regarded as an affliction only met with in children: few, very few, live to the adult age with this incurable affection. Warner, however, has related a case, in which the patient lived till he was twenty. (*Cases in Surgery, p.* 134. *Edit.* 4.)

As I have remarked, the swelling is most frequently situated towards the lower part of the spinal canal, particularly at the place where the lumbar vertebræ join the sacrum. The fluid which it contains resembles serum, being somewhat more liquid than the white of egg, and, like the latter, frequently coagulable. It is in general limpid and colourless; but, occasionally, it is turbid, and tinged with blood. On pressing the tumour, a fluctuation is very perceptible, and a preternatural space may also be felt existing between some of the spinous processes. The fluid is contained in a kind of cyst, which is composed of the continuation of the dura mater, investing the spinal canal, and is usually closely adherent to the integuments.

According to Morgagni, spina bifida is mostly attended with hydrocephalus, and the enlargement of the head has been known to undergo a considerable diminution after the tumour of the spine had casually burst. (*De Sed. et Caus. Morb. Epist.* 7. *art.* 9. *Ephem. Cur. Nat. Decad.* 3, *Art.* 1, *Decad.* 2, *Art.* 2.) The fluid which was lodged in the lateral ventricles, and third ventricle, passed into the fourth, through the aquaductus Sylvii, ruptured the calamus scriptorius, and thus passed into the spinal canal.

Spinæ bifidæ usually occur on the lower part of the spine; but they occasionally take place on the cervical vertebræ, where the tumours have the same characteristic marks as those near the sacrum. Many facts recorded by Ruysch, in his Anatomical Observations, confirm the preceding account.

The present affliction is one of a most incurable nature; for, with the exception of one case mentioned by Morgagni, (*De Sed. et Cause Morb. Epist.* 12, *art.* 9,) a second, recorded by Keilmann, (*Prodrom. Act. Havn. p.* 136.) and two or three others more recently published by Sir Astley Cooper, there is not, I believe, in all the records of medicine, or surgery, any case, which either got well of itself, or was benefited by any mode of treatment. Opening the tumour, either with caustics, or cutting instruments, has generally only tended to hasten the fatal event of the disease. Death soon follows an operation of this kind, and sometimes instantly. Tulpius observes on this subject; *quam calamitatem si quidem reformides, chirurge, cave sis improvide aperias quod tam facilè occidit hominem.* (*Observ. Med.*)

But whether the tumour be opened or not, still the disease is one of the most fatal, to which children are exposed. When afflicted with it, they very seldom live till three years of age; but after lingering several months from their birth, suddenly die. It has been said, that children with spina bifida, always have their legs in a paralytic state. However, this is not true; for the largest spinæ bifidiæ I ever saw, was under my friend Mr. Maul, of Southampton, and was unattended with any weakness of the legs. Indeed the child was, to all appearance, as stout, healthy, and full of play as possible. The fatal event, however, took place after a time, as usual; and if my memory does not fail me, Mr. Maul noticed, that a little before death, a remarkable subsidence of the swelling occurred, though it never burst externally. It is a fact notwithstanding, that many infants with spina bifida, have paralytic legs, and can neither retain their feces nor urine.

If we draw our inferences from the cases and remarks offered by almost every writer on spina bifida, we must regard all attempts to cure the disorder, by making any kind of opening, as exceedingly perilous, if not positively fatal. It is to be observed at the same time, that some practitioners have not altogether abandoned the idea of devising a mode of accomplishing a cure, at least in a few instances. Mr. B. Bell says, that if the tumour proceeded from disease of the spinal marrow or its membranes, no means of cure will probably ever be discovered. But if the the deficiency in the spinous processes of the vertebræ, with which the disease is always accompanied, is not an effect of the complaint as was commonly imagined, and if the collection of fluid takes place from the want of resistance in the dura mater, in consequence of the imperfection of the bones, Mr. B. Bell questions, whether it would not be proper to tie the base of the tumour with a ligature, not merely with a view of removing the swelling, but in order to resist the propulsion of the cyst further outward. Mr. Bell acknowledges, that the event of this practice must be considered as very dubious; but expresses his wish to devise any plan, that would afford even the least chance of success, in a case which must terminate in an unfavourable manner. Mr. Bell mentioned the design of putting the method to a trial, on the first opportunity, and after the detachment of the swelling on the outside of the ligature, he intended to keep a soft compress on the part with a proper bandage. I do not know whether this gentleman ever put the above scheme in practice; but suppose not. It is properly objected to by the author of the article *Spina Bifida*, in the *Encyclopédie Méthodique, Part. Chir.* because the disease is often attended with other mischief of the spinal marrow and brain, and the base of the swelling is almost always too large to admit of being tied at all, or not without hazard of dangerous consequences.

Richter has proposed the trial of two caustic issues at a little distance from the swelling; but I am not acquainted with any facts in favour of this practice.

Mr. Abernethy first suggested the trial of a gentle degree of pressure on the tumour from its commencement, with the view of producing absorption of the fluid, and preventing the distention of the unsupported dura mater. Were the fluid to continue to increase, notwithstanding such pressure, Mr. Abernethy thinks, that as death would be inevitable on the tumour bursting, it might be vindicable to let out the fluid by means of a puncture made with a finely-cutting instrument. The wound is to be immediately afterward closed with sticking plaster, and if possible, healed. Another accumulation is then to be prevented if practicable, with bandages and topical applications. Mr. Abernethy actually made the experiment of a puncture in one hopeless instance, in which, indeed, the swelling had previously just begun to burst. The puncture was repeated every fourth day for six weeks, during which time the child's health continued unaffected. The wounds were regularly healed; but the plaster having been rubbed off one of the punctures, the part ulcerated, the opening could not be healed, the discharge, from having been of an aqueous quality, became purulent, and death ensued. This case was also unfavourable for the trial of the method, as the integuments covering the tumour were diseased, and had no disposition to contract.

The annexed case, published by Sir Astley Cooper, will serve to show the benefit which may be derived from pressure.

"James Applebee, Baldwin-Street, Old-Street, was born on the 19th of May, 1807, and his mother, immediately after his birth, observed a round and transparent tumour on the loins, of the size of a large walnut. On the 22d of June, 1807, the child was brought to my house, and I found, that although it had spina bifida, the head was not unusually large; and the motions of its legs were perfect; and its stools and urine were discharged naturally. I applied a roller around the child's waist, so as to compress the tumour, being induced to do so from considering it as a species of hernia, and that the deficiency of the spine might be compensated for by external pressure. The pressure made by the roller, had no unpleasant influence on its voluntary powers; its stools and urine continued to be properly discharged, but the mother thought that the child was occasionally convulsed. At the end of a week, a piece of plaster of Paris, somewhat hollowed, and that hollow partly filled with a piece of loose lint, was placed upon the surface of the tumour: a strap of adhesive plaster was applied to prevent its changing its situation, and a roller was carried around the waist, to bind the plaster of Paris firmly upon the back, and to compress the tumour as much as the child could bear. This treatment was continued until the month of October, during which time, the tumour was examined about three times a week, and the mother reported that the child was occasionally convulsed. When the child was five months old, a truss was applied, similar in form to that which I sometimes use for umbilical hernia in children, and this has been continued ever since. At the age of fifteen months, it began to make use of its limbs; it could crawl along a passage, and up two pair of stairs. At eighteen months, by some accident, the truss slipped from the tumour, which had become of the size of a small orange, and the mother observed, when it was reduced, that the child appeared in some degree dull; and this was always the case if the truss was left off for a few minutes, and then reapplied. At fifteen months he began to talk; and at two years of age, he could walk alone. He now goes to school, runs, jumps, and plays about as other children. His powers of mind do not appear to differ from those of other children. His memory is retentive, and he learns with facility. He had the measles and small-pox in the first year, and the hooping-cough at three years. His head previously and subsequently to the bones closing, has preserved a due proportion to other parts of the body. The tumour is kept by the truss entirely within the channel of the spine; but when the truss is removed, it soon becomes of the size of half a small orange. It is therefore necessary, that the use of the truss should be continued. When the truss is removed, the finger can be readily pressed through the tumour into the channel of the spine." (*Med. Chir. Trans. Vol.* 2, *p.* 323, *&c.*)

The next case, also published by Sir Astley Cooper, will prove, that spinæ bifidæ may sometimes be treated on another plan, so as to accomplish a permanent cure.

"January 21st, 1809, Mrs. Little of No. 27 Limehouse Causeway, brought to my house her son, aged ten weeks, who was the subject of spina bifida. The tumour was situated on the loins; it was soft, elastic, and transparent; and its size about as large as a billiard ball when cut in half; his legs were perfectly sensible, and his urine and feces were under the power of the will, &c. Having endeavoured to push the water contained in the tumour, into the channel of the spine, and finding that if the whole was returned, the pressure would be too great upon the brain; I thought it a fair opportunity of trying what would be the effect of evacuating the swelling by means of a very fine pointed instrument, and by subsequent pressure to bring it into the state of the spina bifida in Applebee's child. I therefore immediately punctured the tumour with a needle, and drew off about two ounces of water. On the 25th January, finding the tumour as large as before it had been punctured, I opened it again, and in the same manner, and discharged about four ounces of fluid. The child cried when the fluid was evacuated, but not whilst it was passing off. On January 28th, the tumour was as large as at first; I opened it again, and discharged the fluid. A roller was applied over the tumour, and around the abdomen. February 1st, it was again pricked, and two ounces of fluid discharged. On the 4th, three ounces of fluid were discharged. On the 9th, the same quantity of fluid was evacuated as on the 4th; but instead of its being perfectly clear as at first, it was now sanious, and it had been gradually becoming so in the three former operations. On the 13th, the same quantity of fluid was taken away; a flannel roller was applied over the tumour and around the abdomen; a piece of pasteboard was placed upon the flannel roller over the tumour, and another roller over the pasteboard to confine it. On the 17th, three ounces of fluid, of a more limpid kind, were discharged; the pasteboard was again applied. On the 27th, the surface of the tumour inflamed; the fluid not more than half its former quantity, was mixed with coagulable lymph, and the child suffering considerable constitutional irritation, was ordered calomel and scammony, and the rollers were discontinued. On the 26th, the tumour was not more than a quarter of its former size; it felt solid; the integuments were thickened, and it had all the appearance of having undergone the adhesive inflammation. On the 28th, it was still more reduced in size, and felt solid. March 8th, the swelling was very much lessened; the skin over it thickened and wrinkled; a roller was again had recourse to; a card was put over the tumour, and a second roller was applied. March 11th, the tumour was much reduced; the skin covering it was a little ulcerated. On the 15th, it was flat, but still a little ulcerated. On the 27th, the effused coagulable lymph was considerably reduced in quantity, and of a very firm consistence. On the 2d of May, nothing more than a loose pendulous bag of skin remained, and the child appearing to be perfectly well, the bandage was soon left off. On December the 18th, the child was attacked with the small-pox, and went well through the disease. The skin now hangs flaccid from the basis of the sacrum; its centre is drawn to the spine, to which it is united, and thus the appearance of the navel is produced in the tumour by retraction of the skin. The pricks of the needles are very obvious, forming slight indentations." (See *Med. Chir. Trans. Vol.* 2, *p.* 326—329.)

At the time when Sir A. Cooper transmitted this case to the Medical and Chirurgical Society, it had been under his observation two years and a half.

The first of the preceding observations exemplifies the palliative treatment, adopted by the latter gentleman, and consisting of the application of pressure, in the manner of a truss for hernia; the second shows the radical mode of cure by puncturing the swelling from time to time with a needle, and exciting the adhesive inflammation, which, with the assistance of pressure, stops the disease altogether, that is to say, in such examples as admit of cure.

Children are sometimes born with tumours, analogous to spinæ bifidæ, but situated on the head. There is a deficiency of bone at some part of the skull, and through the opening a sac, composed of the dura mater, protrudes, covered only by the integuments. Mr. Earle lately met with such a swelling situated upon the occiput of a female infant. The plan of repeatedly making small punctures with a common needle, discharging the fluid, healing up the punctures, and applying pressure, was tried, and followed up for some time without the occurrence of any unpleasant symptoms. Even punctures were sometimes made with an ordinary lancet; yet the child suffered no harm from the operation, and some hopes of a cure were indulged. At length, however, ulceration of the swelling took place, the child became indisposed, and rapidly sunk. (See *Med. Chir. Trans. Vol.* 7, *p.* 427.) Consult *Ruyschii Obs. Anat. Warner's Cases in Surgery. B. Bell's System of Surgery, Vol.* 5. *Acrel in Schwed. Abhandl.* x. *B. p.* 291, *&c. Murray, Opusc.* 2. *No.* 5, *et Med. Pract. Bibl.* 3, *p.* 612. *Portal Cours d'Anat. Med. T.* 4, *p.* 66. *Lassus, Pathologie Chir. T.* 1, *p.* 260, *et seq. Edit.* 1809. *Abernethy's Surgical and Physiological Essays, Part* 1 *and* 3. *T. V. Okes, An Account of Spina Bifida, with Remarks on the Method of Treatment proposed by Mr Abernethy,* 8vo. *Cambridge,* 1810. *Encyclopédie Méthodique, Part. Chir. Art. Spina Bifida. Richter, Anfangsgr. der Wundarzn. B.* 5, *Kap. A. Cooper, Med. Chir. Trans. Vol.* 2. *p.* 322, *&c. H. Earle, in the same work, Vol.* 7, *p.* 427, *&c. Edinb. Med. and Surg. Journ. No.* 67.

SPINA VENTOSA. The Arabian writers first employed this term, to express a disease, in which matter formed in the interior of a bone, and afterward made its way outward beneath the skin. Until the matter had escaped from within the bone, these authors describe the pain as being incessant and intolerable; but that after the pus had made its way outward by fistulous openings, the pain underwent a considerable diminution. The matter sometimes insinuated itself, from the interior of the bone, into the cellular substance, so as to render it soft and flabby, though not always attended with any change of colour in the skin. The swelling had some of the appearance of emphysema. To express this state, the Arabians added the term *ventosa* to that of *spina*, which was employed, before their time, to express the nature of the pain attendant on the disease. (See an account of this subject in the *Encyclopédie Méthodique, Part. Chir. Art. Spina Ventosa.*)

The term *spina ventosa* has, since the time of the Arabian writers, been used by many to signify the disease named *white-swelling*, and the former might also mean by it a similar affection, though the contrary may be inferred from their account of the matter passing from the interior of the bone under the integuments, a thing which I believe never yet happened in any case of white-swelling. Another, and perhaps a decisive argument, against the original signification of the word being the same as that of white-swelling, is, that it was not restricted to diseases of the joints and heads of the bones; but was also applied to abscesses, which commenced in the cavities of the middle portions of the long bones, where, I need hardly observe, white-swellings never make their attack.

For these reasons, many respectable authors have implied by the term *spina ventosa*, an abscess in the interior of the bone. (See, on this subject, *Latta's System of Surgery, Vol. 1, p.* 165.) Cases of this latter kind, I know, are infinitely rare, compared with that common disorder, the white-swelling; and, I am also certain, from the descriptions given by some authors, that their cases of spina ventosa were in reality instances of necrosis. But that abscesses do occur, and begin in the interior of the bones, more particularly of those of young persons, I have no doubt myself, both from two or three cases, which I remember having seen in St. Bartholomew's Hospital, and from some cases recorded by the most authentic writers. I cannot conceive, however, that suppuration can take place to any extent within a long bone, without being followed by necrosis.

J. L. Petit relates, that a man, with a tumour on the middle of the tibia, who had been treated by him as a venereal patient, found, a fortnight afterward, that the pains which had never ceased, now began to grow more violent. The patient was feverish, his legs became red, and even painful, externally. An incision was made in the situation of the tumour with a view of letting out the matter which was suspected to be the occasion of the bad symptoms, and to have insinuated itself under the periosteum. The incision was of no service, and, two days afterward, the trepan was applied, by which means, a large quantity of matter was let out. The medullary part of the bone seemed quite annihilated, and the cavity almost empty. Petit made three other perforations with the trepan, and cut away the intervening pieces of bone. The actual cautery was also used several times to destroy the caries, and the patient at length got well. (*Traité des Maladies des Os, de J. L. Petit.*) If any one doubt, that abscesses now and then form in the middle of the long bones, I must request him to consult Mr. Hey's *Practical Observations in Surgery, p.* 22, where he may peruse two very interesting cases illustrative of what Mr. Hey calls *Abscess in the Tibia with Caries.*

It must be confessed, however, that these were only cases of necrosis, for which affection the term caries is too often inaccurately used. Indeed, it would appear, from the observations of Dr. Macartney, that a very small suppuration in the medulla is accompanied with the beginning of those changes of the periosteum, which attend necrosis. (See *Necrosis, p.* 762.)

For an account of spina ventosa, in the sense of white-swelling, refer to *Joints. J. Pandolphinus, De Ventositatis Spinæ Sævissimo Morbo,* 12*mo. Norib.* 1674. *A. J. van der Meer, de Spina Ventosa, Duisb.* 1729. *F. L. Augustin, de Spina Ventosa Ossium, Icon.* 4, 4*to Halæ,* 1797. *F. H. Schuchardt, Annotata quædam de Spina Ventosa, cum annexa singulari hujus morbi observatione,* 12*mo. Marburg.* 1817.

SPIRITUS AMMONIÆ COMPOSITUS. Besides the well-known uses of this medicine internally exhibited, its vapours are an exceedingly proper application to the eye in some cases of chronic ophthalmy. Scarpa recommends a remedy of a similar nature.

SPLINTS. Long thin pieces of wood, or tin, or strong pasteboard, employed for preventing the ends of broken bones from moving so as to interrupt the process by which fractures unite. These instruments are sometimes used in other cases, for the purpose of keeping limbs from moving, particularly in some kinds of dislocations, wounds, &c.

In simple fractures of the arm, forearm, or even of the thigh, or leg, in young infants, it matters not whether the splints be made of wood, pasteboard, or tin. In this country, surgeons usually keep sets of splints made expressly for the leg. These are of different sizes, excavated and shaped to the part, and furnished below with apertures for the projecting malleoli. When the limb is laid upon its outside, the foot is also usually supported and kept steady by the under splint, extending some distance towards the toes. Very excellent splints for the legs of young children are made of strong pasteboard, accommodated in shape to the contour of the limb. Splints for the thigh, arm, and forearm, whether made of tin, or wood, should always be slightly concave on the side, which is to be applied to the broken limb. They should likewise be made as thin and light, as is consistent with the necessary degree of strength for preventing the broken bone from bending. The sets of splints, which are used for fractured legs and thighs in England, are frequently furnished with straps, which have a great many small perforations in them at stated distances, and can thus be easily fastened by means of little pegs for the purpose. Tapes are also sometimes employed; but they often get loose, and cannot be depended upon so well as leather straps. Pasteboard, as a material for splints, has one advantage, viz.; when wet, it becomes soft, and admits of being accurately applied to every point of the surface of the limb: consequently, as soon as it dries and recovers its firmness again, it retains the exact shape of the part, and makes every where equal pressure on it, without incommoding the patient. Pasteboard, however, is hardly strong and durable enough for many fractures; nor will it answer when there is any discharge, nor when the surgeon wishes to employ any fluid applications. But, it is generally allowed, that no substance is better calculated for supporting the fractured lower jaw; for, it is perfectly strong enough for this particular case, and if wet before being applied, it forms when dry a solid covering, most accurately corresponding to the shape of the jaw.

Whatever may be the substance of which splints are made, they ought always to be at least as long as the fractured bone; and, if the situation of the limb will allow, they ought, says Boyer, to extend its whole length. "For instance, (says he) for simple fractures of the thighs of very young children, the pasteboard splints, which I employ, reach from the upper part of the thigh, to the lower part of the leg. Generally speaking, the longer splints are, the better they fix the limb, and keep the fracture steady." (*Boyer Traité des Mal. Chir. T.* 3, *p.* 50.)

The number of splints must depend upon their breadth, and the thickness of the limb. For the forearm, two are sufficient; for the upper arm and thigh four are often used; and for the leg two, and sometimes three.

In cases of fractured thighs, when the straight position is preferred, the external splint should extend from the crista of the ilium to some little distance beyond the sole of the foot; while the inner one should reach from the upper and internal part of the thigh also beyond the sole of the foot. With respect to the anterior splint it is indifferent whether it only reaches from the groin to the knee, or as far as the lower part of the leg.

The lateral splints for a broken leg ought to be sufficiently long to embrace the knee, and confine the motions of the foot and ankle. When the straight posture is adopted, a splint is frequently laid along the front of the leg, from the patella to the lower part of the tibia. None however can ever be required under the limb, as there the bedding itself more conveniently affords the necessary degree of support.

Of all the different pieces of the apparatus for the treatment of fractures, the splints are by far the most important and essential. Without them, indeed, it would be in vain to attempt to keep the extremities of the fracture from being displaced.

As splints are generally composed of hard materials, the bad effects of their pressure upon the skin must always be counteracted by placing a sufficient quantity of tow, wool, or other soft substance between them and the limb.

In order to understand, however, the principles, which should guide the surgeon in the choice and application of splints, many remarks, offered in the article *Fracture*, must be consulted.

SPONGIA PRÆPARATA. (*Prepared Sponge; Sponge-tent.*) Formed by dipping pieces of sponge in hot melted emplastrum ceræ compositum, and pressing them between two iron plates. As soon as cold, the substance thus formed may be cut into pieces of any shape. It was formerly much used for dilating small openings, for which it was well adapted, as when the wax melted, the elasticity of the sponge made it expand and distend the opening. However, the best modern surgeons seldom employ it.

SPONGIA USTA. (*Burnt Sponge.*) This is often given in the form of lozenges, in cases of bronchocele, in which particular instances much efficacy is imputed to allowing the lozenges to dissolve gradually in the mouth, after putting them under the tongue. Burnt sponge is also exhibited in many scrofulous diseases, and in cases of chronic enlargement of the prostate gland. The dose is from a scruple to a dram.

STAFF. An instrument of considerable importance in the operation of lithotomy, being in fact the director for the gorget, or knife. It is made of steel, and its handle is generally rough, in order that it may be more securely held. As it is intended to be introduced through the urethra, its shape ought to be principally determined by the natural course of that passage. The English generally employ a staff, the curvature of which forms the segment of a larger circle, than that described by the curvature of a staff used by the French practitioners. (See *Roux, Voyage fait à Londres en* 1814, *ou Parallèle de la Chirurgie Angloise, &c. p.* 319.) In other words, the French staff turns more upward than ours, as it approaches and enters the bladder. There may be some advantage in this construction, inasmuch as it tends to make the gorget enter in the direction of the long axis of the bladder; yet, a great deal more seems to me to depend upon the position in which the staff is held, than upon its shape. Lithotomists should always employ as large a staff as can be easily introduced, because the operation will thereby be facilitated. The groove, the most important part of the staff, is of course situated upon the convexity of the curved part of the instrument, or upon that portion, which, when introduced, lies in the membranous part of the urethra, prostate gland, and the bladder. It should always be made very broad and deep, as recommended by Langenbeck, and Mr. Martineau. (See *Lithotomy.*) The termination of the groove at the end of the instrument should be closed, so as to stop the further entrance of the gorget, and prevent the beak of the latter instrument from doing mischief. English surgeons have been justly censured by Desault and Sabatier, for neglecting this essential caution; for, certainly, the most fatal injury may be done by the gorget slipping beyond the end of the staff. (See *Lithotomy.*) For my own part, if I am more sure of any one thing in surgery, than another, it is this, that the beak of a gorget in the bladder ought never to pass out of, or beyond the groove of the staff.

STAPHYLOMA. (from ςαφυλη, a grape,

from its being thought to resemble a grape.) Is that disease of the eyeball, in which the cornea loses its natural transparency, rises above the level of the eye, and even projects beyond the eyelids, in the form of an elongated, whitish, or pearl-coloured tumour, which is sometimes smooth, sometimes uneven, and, according to Scarpa, attended with total loss of sight. However, staphyloma is either *partial* or *total*: that is to say, it affects only a part or the whole of the cornea; and in the first case, if there be not too much additional injury of the eye, a degree of vision may yet be left, and even admit of further improvement. The circumstance of Scarpa's observations applying only to cases in which the eyesight is already destroyed, accounts for some important differences between him and other writers, who, in the practice which they advise, refer to the *partial* staphyloma, and cases in which the sight is not quite annihilated. Scarpa does not mention adhesion of the iris to the diseased cornea, as a part of the definition of staphyloma; a point in which he differs both from Richter and Beer. (*Lehre von den Augenkr. B.* 2, *p.* 69.) Yet Scarpa may be correct; for though, as Mr. Wardrop remarks, "the internal surface of the cornea adheres to the iris in *almost* every case of staphyloma." (*Essays on the Morbid Anat. of the Eye, Vol.* 1, *p.* 101.) yet, as it does not invariably do so, the circumstance forms no essential part of the nature of the disease. In some instances, Mr. Wardrop has seen the opacity confined to one half of the cornea, and this generally the lower one. (*Vol. cit. p.* 100.)

Scarpa observes, that infants are often attacked by this disease soon after their birth, and mostly in consequence of the purulent ophthalmy. It is also produced by the small-pox, yet never during its eruption, which is singular; nor during the stage of suppuration; but, when the pustules dry, and even after the detachment of the variolous scabs.

In a great number of subjects, says Scarpa, when the staphyloma has attained a certain elevation above the cornea, it becomes stationary, or only increases in due proportion to the rest of the eye. In other instances, the small tumour of the cornea enlarges in all its dimensions, and in such a disproportion to the rest of the eye, that at length it protrudes considerably between the eyelids, to the great molestation and deformity of the patient.

This disease is justly considered as one of the most serious to which the eyeball is subject; for, to the total and irremediable loss of sight that it occasions, are added all the evils which necessarily result from the bulk and protuberance of the staphyloma, after the swelling of the cornea has acquired such a size, that it can no longer be covered by the eyelids. In such circumstances, the continual exposure of the eyeball to the contact of the air, and particles of matter suspended in it; the friction of the eyelashes; the incessant flux of tears down the subjacent cheek; render the eye painful and inflamed; the sound one is affected by sympathy, and the diseased one at length ulcerates, together with the lower eyelid and cheek, on which it presses.

According to Richter (*Obs. Chir. Fasc.* 2.) staphyloma is generally formed, without the swelling of the cornea being preceded by any of those morbific dispositions, which are generally considered capable of weakening the texture and elasticity of the cornea; which, in fact, acquires a much greater thickness, than what it has in its natural state, and consequently, staphyloma, far from being concave within, is every where compact and solid; though it ought to be quite the contrary, if the tumour were occasioned, as Beer yet appears to believe, by an immoderate distention, operating on the cornea from within outward, with absorption of its natural texture.

Scarpa thinks, that Richter has generalized his doctrine too much, by not drawing any line of distinction between the staphyloma of recent occurrence in infants, and that of adult subjects, in whom the disease has acquired so large a volume, as to protrude considerably beyond the eyelids. He agrees with Richter, that the recent staphyloma in infants is quite compact and solid, on account of the augmented thickness of the cornea; but he is convinced by repeated observation, that, in this very same staphyloma, originally quite solid and compact, the cornea becomes thinner, or, at all events, is not thicker than natural, after the disease has existed a series of years in adult subjects, and in whom the swelling of the cornea has attained such a size as to protrude beyond the eyelids. The tumour, he observes, is not solid throughout, except in regard to its containing, in its amplified state, the iris, the crystalline, and very often, also, a portion of the vitreous humour.

The cornea of infants, in its natural state, is at least twice as thick and pulpy as that of adults, and, consequently, the anterior chamber of the aqueous humour, in the former, is comparatively so contracted, to what it is in the latter, that, in infants at the breast, the cornea may be considered as in contact with the iris.

To such qualities of the cornea, in children of tender years, and to the natural narrowness of the anterior chamber of the aqueous humour, Scarpa imputes the cause why ophthalmies in infants so often produce opacity and thickening of this membrane. The cornea swells, becomes preternaturally thickened, and is very soon converted into a pointed, whitish, or pearl-coloured tumour, without any cavity internally, and either in perfect contact with, or adherent to, the iris. In the course of years, however, Scarpa remarks that this disease undergoes new modifications. For, as the whole eye enlarges with age, the iris and crystalline, from causes not sufficiently understood, abandon their natural situation, and are propelled forward, nearer and nearer to the cornea, which they in time distend in all its dimensions, so as to make it project beyond the eyelids, at the same time rendering it thinner in a ratio to its bulk and magnitude. Scarpa has never met with a voluminous staphyloma, projecting beyond the eyelids in adult persons, which had not originally made its first appearance in infancy; and he has invariably found, that the thickness and density of the cornea, both in the living and dead bodies of those who have been affected with this disease, were in an inverse ratio to the eye. In inveterate cases of staphyloma, forming a large protuberance beyond the eyelids, the iris may here and there be clearly discerned through the diseased cornea, and if it be not equally manifest at all points of the tumour, it is because the conjunctiva externally spread over the cornea forms, in conjunction with its varicose vessels on the surface of the tumour, a stratum of matter, not every where equally dense and opaque. This dense stratum of the conjunctiva, spread over the cornea, easily causes deception in a staphyloma of considerable bulk. The more the tumour increases, the more the substance of the cornea seems to become dense and thickened; while in reality the contrary happens; for the augmentation in the density of the layer of the conjunctiva, covering the cornea, only partly supplies the diminution in the thickness of the latter membrane. In staphyloma, as Mr. Wardrop observes, "the pupil is hid according to the situation and degree of the opacity of the cornea; but, in most cases it is altogether obliterated, and even in those, where a transparent portion of the cornea is opposite to it, the vision is much impaired; for, as *the eye has lost its form as an optical instrument, the change in its refractive power must render objects very indistinct.*" (*Morbid Anat. of the Eye, Vol.* 1, *p.* 101.)

The sclerotica is also subject to staphyloma, that is, to a partial distention and prominence of its anterior hemisphere in the white of the eye. Scarpa never met with any tumour or prominence on the front surface of the sclerotica, corresponding to the white of the eye; but in the dead subject he has met with two examples of staphyloma in the posterior hemisphere of the sclerotica. According to Mr. Travers, in the spheroidal staphyloma of the cornea, the sclerotica sometimes yields so much as greatly to increase the deformity. "This happens in hydropic and other degenerations of the humours. It also frequently becomes extenuated, or bulged near its junction with the cornea in the amaurosis, which follows inflammation of the choroid. This protrusion, larger or smaller, is sometimes circumscribed, and in other instances diffused over a large portion of the ball. It is often seen encircling the cornea, and presenting a sacculated or pouched appearance. It has a bluish gray tint, &c." (*Synopsis of the Diseases of the Eye, p.* 130.)

When in the staphyloma of the cornea, this part is affected with irremediable opacity, Scarpa thinks that if the disease be recent, and in a child, the only object must be to hinder the increase of the swelling of the cornea, the organization of which is already destroyed. The tumour must be levelled, and flattened as much as possible; and when the swelling of the cornea is inveterate, very large, and prominent beyond the eyelids, it is to be diminished by surgical means, so as to return within the orbit, sufficiently to permit the deformity of the face to be amended by the application of an artificial eye.

In cases of recent staphyloma, Richter used to make at the bottom of the tumour of the cornea an artificial ulcer, by repeatedly applying the argentum nitratum, or the oxygenated muriate of antimony (butter of antimony,) and to keep the little sore open by the continued use of the same caustic, with the view of effecting a diminution of the swelling of the cornea. In this way Richter frequently succeeded in lessening staphyloma, and in one particular case he even restored the transparency of the cornea. *Ter repetitâ operatione, quarto scilicet, septimo et decimo die, ne vestigium quidem morbi die decimo-quarto superabat. Obs. Chir. Fasciculus* 2.

Though Scarpa has frequently attempted to cure the recent staphyloma of infants by the above method, he has never yet met with such success, as can be at all compared with Richter's, either in restoring the transparency of the cornea, or accomplishing a diminution of the volume of the staphyloma. Having formed with the argentum nitratum a small ulcer, at the bottom of the cornea, and kept the sore open thirty days and more, he failed in obtaining any benefit, in respect to the diminution, much less the opacity of the cornea, in three infants, one a year and a half old, and the two others somewhat more than three, all which subjects had been recently attacked with staphyloma in one eye, in consequence of the small-pox. A violent chemosis, in a very short time produced a staphyloma in the eye of a child five years old. Scarpa made an ulcer at the bottom of the cornea, in the unorganized swollen substance of which he introduced, for a little depth, the flat part of a lancet. Scarpa kept the sore open for five weeks, with a solution of the argentum nitratum, and he remarked that the staphyloma became somewhat flatter, so as to lose the acute prominence which it had at its centre; but the cornea continued, as before, every where opaque. Though Scarpa employed the same method in two other subjects, of about the same age, and in the same circumstances; though he kept the ulcer open fifty days, he was never able to effect any depression or diminution of the staphyloma; and, consequently, the pointed, pearl-coloured projecting part of the tumour continued in the same state as it was before. The conical shape which the cornea assumes in this disease, he observes, is a characteristic symptom by which a staphyloma may be distinguished from a leucoma, with total opacity of the cornea.

If, also, in the course of further trials, partial benefit be found to accrue from this plan, adopted not for the purpose of re-establishing the transparency of the cornea, but for that of merely checking and diminishing the recent staphyloma in infants, still Scarpa is of opinion, that no one will be easily persuaded that the same treatment can ever prove of the least service in diminishing the size of the large, inveterate staphyloma in adults; in other words, of that which projects beyond the eyelids, and rests on the cheek. Under these circumstances, he believes, that there is no effectual means of restraining the progress of the complaint, and removing the deformity, but cutting away the staphyloma, and when the place is healed, an artificial eye may be applied.

Celsus thus expresses himself on the subject of this operation:—*Curatio duplex est. Altera ad ipsas radices per medium transuere acu, duo lina ducente, deinde alterius lini duo capita ex superiore parte, alterius ex inferiore adstringere inter se quæ paulatim secando id excidant. Altera in summâ parte ejus ad lenticulæ magnitudinem exscindere; deinde spodium, aut cadmiam infricare. Utrolibet autem facto, album ovi lana excipiendum, et imponendum; posteaque vapore aquæ calidæ fovendus oculus, et lenibus medicamentis unguendus est.* De Medicina, lib. 7, cap. 6.

Though, says Scarpa, the first plan, or that of the ligature, is at present abandoned, the majority of surgeons still persevere in passing a needle and ligature through the lower part of the staphyloma, not for the purpose of tying or constricting the tumour, it is true, but of making a noose, in order to fix the eye conveniently, when the staphyloma is to be cut off in a circular manner. This use of a needle and ligature, which I observe is sanctioned by Mr. Travers, (*Synopsis, &c. p.* 285,) is strongly disapproved of by Scarpa.

With regard to the second method of removing the staphyloma, or that of excision, Scarpa thinks that sufficient attention has not hitherto been paid to what Celsus has written on this subject. In fact, Celsus does not forbid cutting away the staphyloma, by a circular incision at its base, as is practised at the present day, but says that this operation is to be done in the centre, or conical point of the tumour, and that as much of this part of the staphyloma is to be cut away as will equal a lentil in size: *In summâ parte ejus ad lenticulæ magnitudinem exscindere.* Scarpa remarks, that the great importance of this precept of Celsus, in regard to the successful treatment of the staphyloma, can only be duly appreciated by surgeons who have often had occasion to compare the advantages of Celsus's doctrine, with the serious inconveniences which result from the common practice of cutting away the staphyloma circularly at its base; and with the evils produced by a semicircular section, comprehending the sclerotica, in Woolhouse's manner, always followed by acute inflammation of the eyeball and eyelids, violent pains in the head, restlessness, spasms, copious, and sometimes gangrenous, suppurations of the eye and eyelids.

The patient being seated, Scarpa directs an assistant to support his head properly; then taking in his hand a knife, similar to what is used in the extraction of the cataract, he passes the instrument completely across the staphyloma, at the distance of one line and a half, or two lines, from the centre or apex of the tumour, from the external towards the internal angle of the eye, and by passing the knife forward in the same direction, just as is done in the extraction of the cataract, he makes a semicircular incision downwards, in the most prominent part of the tumour. Having done this, he takes hold of the segment of the staphyloma with the forceps, and turning the edge of the knife upward, he completes the circular recision of the apex of the tumour, in such a way that the detached portion is one, two, three, or four lines in diameter, according to the size of the staphyloma. As a portion of the iris adhering to the cornea, from the very commencement of the disease, is commonly included in this section of the pointed part of the tumour, no sooner is the circular division of the apex of the staphyloma made, than the crystalline, or its nucleus, issues from the eye, followed by a portion of the vitreous humour. In consequence of this evacuation, the eyeball often diminishes in such a degree, that it can be covered by the eyelids, to which Scarpa immediately applies a pledget of dry lint, supported by a retentive bandage.

When the eye and eyelids begin to be painful, inflame, and swell, as they generally do on the fourth day, the eye is to be covered with a bread and milk poultice. When things proceed in a regular manner, the swelling of the eyelids subsides about the seventh or ninth day, and purulent matter is seen on the poultice, blended with the vitreous humour. The matter afterward becomes thick and whitish, the patient feels great relief, and the eyeball shrinks and sinks into the orbit.

At this period, on gently separating the eyelids, the conjunctiva is found swelled, and reddish, and the margin of the wound seems like a whitish circle. This is usually detached on the twelfth or fourteenth day after the operation, when the edge of the surface, from which the staphyloma was cut, becomes red, contracts, and daily diminishes, so that at last the wound is entirely closed. There only remains in the centre of the cornea, for a few days, a small fleshy prominence, resembling a little reddish papilla, which, after being touched a few times with the argentum nitratum, contracts, and heals.

So far, says Scarpa, are alarming symptoms from following this operation, that in a great number of cases the surgeon is even obliged, several days afterward, to stimulate the eye on which it has been performed, in order to make it inflame, partly by leaving it a long while uncovered, and exposed to the air, partly by enlarging the circular recision, made in the centre of the staphyloma, of which another circular portion, half a line broad, is removed, in order to facilitate the more abundant discharge of the humours, and the ingress of air into the cavities of the eye, which are so backward to inflame. As soon as inflammation has invaded the interior of the eye, and suppuration has taken place, the rest of the cure regularly follows under the use of topical emollients, and is soon completed with all possible mildness.

It should be particularly recollected, that Scarpa means the foregoing practice for inveterate cases of staphyloma, where the eyesight is totally lost, and the projection of the diseased cornea produces serious annoyance. Under other circumstances, the method can hardly be admissible. Among others, Dr. Vetch particularly objects to the removal of the apex of the tumour, as destructive of all chance of the recovery of a degree of vision; a consideration, however, which would not exist in the hopeless cases spoken of by Scarpa. Dr. Vetch also disapproves of letting out the aqueous humour in cases of staphyloma as an endless operation, from which no permanent effect takes place, the humour collecting again in a few hours; a sentiment which is likewise expressed by Mr. Travers. (See *Vetch on the Diseases of the Eye, p.* 63; *and B. Travers, Synopsis, &c. p.* 286.) For the purpose of accomplishing the gradual diminution of the tumour, and *bringing the eye into a state in which an artificial pupil may be made*, Dr. Vetch has employed caustic (the method commended both by Richter and Beer) and the introduction of a seton through the tumour. Beer confirms the statement of Scarpa, concerning the impossibility of restoring the transparency of any part of the cornea affected with staphyloma. For the relief of a partial staphyloma, he prefers the cautious application of the oxygenated muriate of antimony, by means of the point of a camel-hair brush, while the eyelids are held asunder. The diseased part of the cornea is to be smeared with it until a small white superficial slough is formed, when every particle of the caustic must be immediately washed out of the eye with another larger camel-hair brush, dipped in water, or milk. The application is not to be repeated until the subsequent inflammation has quite subsided, and the slough been thrown off. Beer condemns all escharotic salves, because their action extends to parts which should be left unirritated. (*Lehre von den Augenkr. B.* 2, *p.* 74.)

Wenzel, and numerous other writers, imply by staphyloma, a protrusion of a piece of the iris through a wound or ulcer of the eye. (See *Iris, Prolapsus of.*)

R. Fr. B. Hoelder, De Staphylomate. Tubingæ, 1748. *Scarpa Sulle Malattie Degli Occhi, Ed.* 5. *G. J. Beer's Ansicht der Staphylomatosen Metamorphosen des Auges, &c. Wien.* 1805. *Nachtrag zur Ansicht, &c.* 1806; *and Lehre von den Augenkr. B.* 2, *p.* 69, 8*vo. Wien.* 1817. *Richter, Anfangsgründe der Wundarzneykunst. B.* 3, *p.* 153. *&c. Gott.* 1795. *Sabatier, Médecine Operatoire. T.* 2, *p.* 191, *Ed.* 2, 1810. *James Wardrop Essays on the Morbid Anatomy of the Human Eye, Vol.* 1, *p.* 99, 8*vo. Edinb.* 1808. *B. Travers, Synopsis of the Diseases of the Eye,* 8*vo. Lond.* 1820. *J. Vetch, A Practical Treatise on the Diseases of the Eye,* 8*vo. Lond.* 1821.

STEATOMA. (from στεαρ, fat.) A wen, or encysted tumour, containing fat. See *Tumours, Encysted.*

STELLA, or STELLATED BANDAGE. A bandage so named because it makes a cross, or star, on the back. It is a roller, applied in the manner of a figure 8, so as to keep back the shoulders. It is often employed in cases of fractures and dislocations of the clavicle.

STRAMONIUM. A series of interesting experiments were detailed in illustration of the properties of stramonium, in a Dissertation, which was read to the Medical Faculty of the University of Pennsylvania, on the 12th of May, 1797, by Dr. Samuel Cooper. The experiments No. 15 and 16, merit particular notice in this Dictionary, as being, perhaps, the earliest discovery of the effect of the local application of powerful narcotics in dilating the pupil. A drop of an infusion of the powder of stramonium was let fall into the left eye. In half an hour the pupil began to enlarge, and attained its greatest dimensions about twelve hours after the experiment, at which time it was viewed in a considerable light, and seemed thrice as large as the other. It continued dilated two days. In a strong light, objects were seen more distinctly with the right eye; but in a weak light, with the left. Some other gentlemen, however, on whom the experiment was tried, experienced no increased power of seeing in the dark. A drop of the expressed juice, dropped into the eye of a cat, soon converted the whole of the coloured part of the eye into pupil. (See *Caldwell's Medical Theses, p.* 173, 8*vo. Philadelphia,* 1805.) Stramonium, then, resembles belladonna and hyosciamus in its action upon the iris. It has been exhibited internally, in epilepsy, tic douleureux, and severe chronic pains, and used in poultices for dispersing indurations of the breast, and in ointments for allaying the pain of piles. The doses should at first be only gr. ss. of the extract twice a day, but they may be gradually increased to five grains.

STRICTURE. (from *stringo,* to bind.) A diminution, or contracted state of some tube, or duct, in the body. See *Urethra, Strictures of; Œsophagus, &c. Rectum, &c.* Stricture also means, in cases of strangulated hernia, the narrowest part of the opening, or passage through which the bowels protrude, which narrowest part makes on the viscera the pressure causing all the bad symptoms. See *Hernia.*

STRUMA. (from *struo,* to heap up.) Scrofula, or Scrophula. The King's Evil. See *Scrofula.*

STYE. A little inflammatory tumour on the eyelid. See *Hordeolum.*

SULPHURIC ACID. The strong sulphuric acid is not much used in the practice of surgery, except as a means of extricating from the nitrate of potash, or muriate of soda, certain gases for the purpose of purifying the air of sick rooms, or infected places. A few practitioners have also sometimes employed it, blended with sixteen times its weight of lard, as a local application for the cure of scabies. As a caustic, it is not generally eligible, because it is difficult to limit its operation exactly to the parts which are intended to be destroyed. A few years ago, a proposal was made to apply this acid along the outside of the eyelid, in cases of trichiasis, so as to produce a slough, and subsequent ulcer, the cicatrization of which draws out the inverted tursus. Nay, it is alleged that the application sometimes produces an instantaneous amendment of the position of the eyelid. I have seen one example, in which the experiment was tried; but whether it was owing to the acid not having been sufficiently applied, or other causes, the method did not answer so well as the usual plan of removing a part of the integuments with a cutting instrument.

Diluted sulphuric acid is frequently employed as an ingredient in gargles. It is also commonly exhibited with a view of checking passive hemorrhages, and profuse nocturnal sweats in hectic fever. The dose is from ten to thirty drops.

This acid, in the diluted form, has been tried in venereal cases. According to Mr. Pearson, when a bad state of health prohibits the introduction of mercury, the case has not yet put on an unequivocal appearance, or dyspeptic symptoms, attended with profuse perspirations, harass the patient, it is an useful remedy, capable of giving a temporary check to the progress of the disease. He says, that he has often seen it arrest the progress of venereal ulcers of the tonsils, and make venereal eruptions fade and nearly disappear; but that these beneficial effects were never permanent. At the same time he acknowledges that the medicine will confer actual and durable benefit in ulcers of the penis, groin, and throat, sometimes remaining stationary after a mercurial course. He has likewise found this acid very efficient, when mercury acts too violently upon the mouth. (See *Pearson's Obs. on the Effects of various Articles in the Cure of Lues Venerea*, p. 189—191, *Ed.* 2.)

In cases of poison by sulphuric acid, the most successful treatment consists in making the patient drink large quantities of water, in which calcined magnesia is suspended. Should this last medicine, however, not be at hand, soap blended with water, is the best substitute. While these remedies are preparing, copious draughts of some mucilaginous beverage, milk, or even of common water, should be administered without delay; for the practitioner should ever be mindful, that so rapidly does sulphuric acid operate upon the texture of the parts with which it comes into contact, that all chance of saving the patient must depend upon the quickness with which the means to counteract the poison are applied. After the acid has been diluted and neutralized, local and general bleeding, emollient clysters, and mucilaginous drinks, constitute the best remedies. (*Orfila, Traité des Poisons, &c. Vol.* 1. *p.* 434, *Ed.* 2.)

SUPPRESSION OF URINE. See *Urine, Retention of.*

SUPPURATION. A process, by which a peculiar fluid, termed *pus*, is formed in the substance, or from the surface of parts of the body. From the observations made in the article *inflammation*, it appears, that when this last affection is above a certain pitch, it sometimes terminates in suppuration.

When purulent matter accumulates in the part affected, it is termed an *abscess*, which is distinguished into several kinds, the *acute*, *chronic*, *venereal*, *scrofulous*, &c.

It is observed by Professor Thomson, that the texture, in which suppuration seems to be most readily produced, by a certain degree of inflammation, is mucous membrane, whether this lines excretory ducts, or canals, or covers the inner surfaces of the respiratory, or urinary organs. In a few hours, after an irritating cause has been applied to these surfaces, the physical and chymical qualities of the fluid which they secrete in their natural state, are changed. From being a tough viscid substance, not easily miscible with water, the mucus of the nose and bronchia becomes, during an attack of inflammation, very readily miscible with water, of a yellowish white colour, and fluid consistence. If, in this state, the secretion from these membranes be examined with the microscope, it will be found to contain small globules, similar to those which are seen in the blood; and these globules are found to increase in number in proportion to the degree and continuance of the inflammation. We have examples of the production of this pus, or at least of a puriform fluid, in the respiratory organs of persons affected with catarrh, and in the urinary organs of those who labour under gonorrhœa. In the progress of these diseases, we can generally trace the changes, which take place by slow, but sensible degrees, in the nature of the secretion, from mucus to pus, and from pus back again to the state of mucus. This puriform discharge from mucous membranes, in a state of inflammation, may be kept up for months without these membranes appearing to undergo any other morbid changes than a slight degree of redness and swelling. A loss of substance, or ulceration, is found not to happen oftener than in one case out of ten examples of suppuration from mucous membranes. (*Thomson's Lectures on Inflammation, p.* 305, 306.)

The same well-informed writer afterward proceeds to explain, that suppuration may be readily produced in the skin, or cutaneous texture, by whatever excites inflammation in that texture, and causes a separation of the cuticle. We have examples of this fact in blisters from cantharides, and in vesications of the cuticle from superficial burns. If the cuticle covering a recent blister, or burn, be removed, and the cutis exposed to the irritation of stimulating substances, pus will soon be discharged from the abraded surface. Suppuration can be kept up in cutaneous texture, for an indefinite length of time, as we see done every day in the management of perpetual blisters. Ulceration is seldom observed in these cases, and consequently, in cutaneous texture, loss of substance is by no means necessary for the production of pus.

If the cutis be divided, as in a wound, or a portion of it removed, as in the extirpation of tumours, and either the air, or any other external body, be permitted to remain in contact with the divided surfaces, the process of suppuration is speedily induced in the cellular texture subjacent to the skin. After the hemorrhage, which takes place from the small vessels, has ceased, an oozing of a fluid, at first resembling serum, occurs, which is gradually changed into pus. But in this case, as Dr. Thomson has correctly observed, the surface of the wound is previously covered with a layer of coagulable lymph, which is penetrated with blood-vessels, and gradually raised into the little red eminences, termed granulations.

Appearances similar, though slighter in degree, says Dr. Thomson, are observed in cutaneous suppuration, giving probability to the opinion of Sir E. Home, that in inflammation, a vascular surface is produced previously to the formation of pus in a cellular membrane, and perhaps also in cutaneous texture. Dr. Thomson is inclined to believe, however, that no new vascular surface is generated in the inflammation of mucous membrane. Thus, we see, that in the formation of pus in mucous membrane, cutaneous texture, and exposed cellular substance, no ulceration, no breach of substance occurs: but that, on the contrary, in two of these textures, the cutaneous and cellular, there is an addition made to the parts by the exudation of coagulable lymph, which becomes organized. (*Thomson, p.* 305—308.)

SYMPTOMS OF SUPPURATION.

When matter is fully formed in a tumour, there is a remission of all the symptoms. The throbbing pain, which was before frequent, now goes off, and the patient complains of a more dull, constant, heavy pain A conical eminence, or *pointing*, as it is termed, takes place at some particular part of the tumour, generally near its middle. In this situation, a whitish, or yellowish appearance is general observable, instead of a deep red, which was previously apparent, and a fluctuation of a fluid underneath may be discovered, on a careful examination with the fingers. Sometimes, indeed, when an abscess is thickly covered with muscles and other parts, the fluctuation cannot be easily distinguished, though, from other concurring circumstances, there can hardly be the least doubt of there being even a very considerable collection of matter. An œdematous swelling over the situation of deeply-situated abscesses is a symptom which often occurs, and is well worthy the attention of every practical surgeon.

The discovery of the existence of deep abscesses is a circumstance of the highest importance in practice, and one which greatly involves the practitioner's reputation. In no part of the surgeon's employment is experience in former similar cases of greater use to him than in the present; and however simple it may appear, yet nothing, it is certain, more readily distinguishes a man of observation and extensive practice, than his being able easily to detect collections of deep-seated matter. On the contrary, nothing so materially injures the character and professional credit of a surgeon, as his having in such cases given an inaccurate or unjust prognosis; for, in disorders of this kind, the nature and event of the case are generally at last clearly demonstrated to all concerned.

Together with the several local symptoms of the presence of pus, already enumerated, may be mentioned the frequent shiverings, to which patients are liable on its first formation. However, these rigours seldom occur so as to be distinctly observed, unless the collection of matter is considerable, or situated internally in some of the viscera.

"In the progress of the fever, accompanying acute inflammation, (says Professor Thomson) rigours, or cold shiverings not unfrequently take place, which recur at irregular intervals, and are in general followed by a hot fit, and slight increase of the febrile symptoms. These rigours, or cold shiverings, in general indicate, when they occur in the progress of inflammatory diseases, that pus either is formed, or is about to be so. In inflammation, succeeding to injuries of the head, these rigours are often the first constitutional symptoms which give alarm to the well-informed practitioner; for they are generally, though not always, an indication that inflammation has already made a dangerous, if not fatal progress. These rigours also accompany the formation of pus in the viscera contained within the cavities of the chest and belly, and are often the first symptoms which inform the practitioner, that his endeavours to procure resolution have not been successful." (See *Thomson's Lectures on Inflammation, p.* 321.)

Rigours, as Mr. Hunter remarked, are more common at the commencement of spontoneous inflammations, than in inflammations from external injury. They seldom occur in the suppurations which follow operations.

The constitutional symptoms which attend the formation of pus in the progress of chronic suppurations, are generally comprehended under the name of hectic fever. (See *Fevers.*)

The pain attending what Mr. Hunter termed the suppurative inflammation, is increased at the time when the arteries are dilated, and this gives the sensation called throbbing, in which every one can count his own pulse, by merely paying attention to the inflamed part. Perhaps, this last symptom is one of the best characteristics of this species of inflammation. When the inflammation is moving from the adhesive state to the suppurative, the pain is considerably increased; but when suppuration has taken place, the pain in some degree subsides. (*Hunter.*)

The redness that took place in the adhesive stage is now increased, and is of a pale scarlet colour. The part which was firm, hard, and swelled, in the previous stage of the inflammation, now becomes still more swelled, in consequence of the greater dilatation of the vessels, and the greater quantity of coagulating lymph thrown out. (*Hunter.*)

THEORY OF SUPPURATION.

The dissolution of the living solids of an animal body into pus, and the power of this fluid to continue the dissolution, are opinions which are no longer entertained by any well-informed surgeons of the present day; and the use of such phrases as "*pus corrodes,*" "*it is acrid,*" &c. expressions which imply an erroneous way of thinking, is very properly almost entirely discontinued in the language of every sinsible medical man. If these notions were true, no sore which discharges matter, could be exempted from a continual dissolution. Such ideas probably arose from the circumstance of an abscess being a hollow cavity in the solids, and from the supposition, that the whole of the original substance of that cavity was now the matter, which was found in it. This was a very natural way of accounting for the formation of pus by one entirely ignorant of the moving juices, the powers of the arteries, and what takes place in an abscess after it is opened. The knowledge of these three subjects, abstracted from the knowledge of the abscess before its being opened, should have led surgeons to account for the formation of pus from the blood by the powers of the arteries alone. According to the above erroneous principle, abscesses would continue to increase after being opened, as fast as before. Upon the principle of the solids being dissolved into pus, was founded the practice of bringing all indurated parts to suppuration if possible, and not making an early opening. This was done for the purpose of giving time for the solids to melt down into pus; but it was apparently forgotten, that abscesses formed matter after they were opened, and therefore the parts stood the same chance of dissolution into pus as before. Blinded with the idea that the solids entered into the composition of pus, the partisans of this doctrine could never see pus flowing from any internal canal, as from the urethra, in cases of gonorrhœa, without supposing the existence of an ulcer in the passage. Such sentiments might be forgiven before it was known that these surfaces could, and generally did, form pus without a breach of the solids; but the continuance of this way of thinking now is not mere ignorance, but stupidity. The formation of pints of matter in the cavities of the chest and abdomen, without any breach in the solids, could not have been overlooked by the most zealous advocates for the doctrine of dissolution. (*Hunter.*)

The moderns have been still more ridiculous; for knowing that it was denied, that the solids were ever dissolved into pus, and that there was not a single proof of it, they have been busy in producing what to them seemed a proof. They have been putting dead animal matter into abscesses, and finding that it was either wholly or in part dissolved, they therefore attributed the loss to its being formed into pus. This, however, was putting living and dead animal matter upon the same footing, which is a contradiction in itself; for if the result of this experiment were really what they supposed it to be, the idea of living parts being dissolved into pus must be abandoned, because living and dead animal matter can never be considered in the same light. (*Hunter.*)

It might have been remarked, that even extraneous animal matter would lie in abscesses for a considerable time without being dissolved, and that in abscesses arising either from violence, or from a species of erysipelatous inflammation, there were often sloughs of the cellular membrane, which sloughs would come away like wet tow, and therefore were not dissolved into pus. (*Hunter.*)

It might also have been noticed, that in abscesses in tendinous parts, as about the ankle, a tendon often mortified and sloughed away, and that the sores would not heal till such sloughs were detached; but though this separation was sometimes not completed before the expiration of months, yet the sloughs at last were thrown off, and consequently could not be converted into pus. Pieces of dead bone often lie soaking in matter for many months, without being changed into pus; and although bones, so circumstanced, may lose a considerable deal of their substance, a loss which some might impute to the dissolution of the bone into pus, yet that waste can be accounted for and proved on the principle of absorption. The loss is always upon that surface, upon which the continuity is broken off, and it is a part of the process by which exfoliation of a dead piece of bone is accomplished. The formation of pus has been attributed to a kind of fermentation, in which both the solids and fluids were concerned. This doctrine is easily refuted by stating what happens in internal canals, which naturally secrete mucus, but frequently form pus, without any loss of substance, or any previous fermenting process. Were we to suppose a fermentation of the solids and fluids, the immediate cause of the production of pus, whence could the solids come, which enter into the composition of discharges from the urethra? for the whole penis could not afford matter enough to form the pus, which is discharged in a common gonorrhœa. How also could the fermentation of the solids ever cease? for there is the same surface secreting its mucus, whenever the formation of pus is discontinued. It may be asked likewise, by what power the first particle of pus in an abscess, or on a sore, is formed, before there is any particle existing, which is capable of dissolving the solids? An abscess may be stationary for months, and at last be absorbed; what becomes of the fermentation all the while the collection of matter continues stationary?

Extravasated blood has been supposed to be capable of being converted into pus. We find, however, that blood, when extravasated, either from violence, or a rupture of a vessel, as in aneurism, never of itself becomes pus; nor was pus ever formed in these cases, without being preceded by inflammation. Both the blood and matter are also found together in the same cavity, under such circumstances. If the blood had coagulated, which it seldom does in cases of violence, it would be found still coagulated; and if it had not coagulated, the pus would be bloody. (*Hunter.*)

The modern theory of suppuration is, that the matter is separated from the blood by the secreting power of the vessels of the inflamed part, which acquire a new mode of action.

That pus is formed in the vessels from which it exudes, by an action of these vessels analogous to secretion, was, so far as I know, (says Professor Thomson) first distinctly suggested by Dr. Simpson of St. Andrew's, in his "*Dissertationes de Re Medica,*" published in the year 1722. An opinion similar to that of Dr. Simpson's suggested itself, about the year 1756, to De Haen, from the consideration of what takes place in some cases of phthisis pulmonalis. This author observes, that pus was often expectorated, for a great length of time, by patients affected with phthisis, in whom, after death, no mark of ulceration could be perceived, not even the place in which the pus had been formed. The hypothesis of pus being a secretion was afterward more fully considered by Dr. Morgan of Philadelphia, in his inaugural thesis printed at Edinburgh in 1763, entitled "*Puopoioses, sive Tentamen Medicum de Puris Confectione.*" The belief that pus is a secretion, or formed at least by an action of the vessels analogous to secretion, was adopted by Mr. Hunter. Indeed, the merit of the original suggestion of this hypothesis has been ascribed to him, though improperly. Bruggman, professor of botany at Leyden, has maintained the same doctrine in an excellent thesis "*De Puogenia,*" published in 1785; and it is that which is now very generally taught all over Europe. (See *Thomson's Lectures on Inflammation, p.* 316, 317.) With respect to suppuration from exposed surfaces, however, it is more proper to say, that the vessels secrete a fluid, which *becomes* pus; for Sir Everard Home has proved, that this fluid has not the purulent appearance, when first secreted, but acquires it while it remains on the inflamed surface, and does not acquire it the less readily, when removed from that surface in a colourless state, provided its proper temperature be preserved, and it be kept exposed to the air, which promotes the change.

The opinion that suppuration is a process analogous to glandular secretion, was at first hastily rejected by many who were swayed by the fact, that no pus is ever found blended with the blood in the circulating system. By this mode of reasoning, however, such thinkers must be led to deny the universally received and undoubted doctrine, that the bile is a secretion; and yet it is well known, that nothing like this fluid can be detected in an analysis of the blood, and, indeed, a very small quantity would be sufficient to tinge the whole mass of circulating blood with a yellow colour, the same as we see in cases of jaundice. No one would wish to defend the idea of there being either pus, or bile, actually in the circulation; but only the matter, or modifications of the matter, which, by the combinations, or whatever changes we may choose to term them, taking place in the secreting vessels, and by their operations are converted into one of the particular fluids in question.

Violence done to parts is one of the great causes of suppuration; but simply, violence does not always occasion it. The violence must be followed by a prevention of a cure in a more simple way, viz. by a restoration of the structure, so as to carry on the animal functions of the part. The parts must be kept long enough in that state into which they were put by the violence. Or what is somewhat similar to this, the violence must be attended with death in a part, as, in many bruises, all mortifications and all sloughs, in consequence of the application of caustic, which, when the dead parts separate, leave internal surfaces exposed. (*Hunter.*)

As every injury or effect of outward violence, under the above circumstances, is more or less exposed to the surrounding air, the application of air to internal surfaces has been assigned as a cause of suppuration; but certainly the air has not the least effect on parts, circumstanced as above, for a stimulus would arise from a wound, were it even contained in a vacuum. In circumscribed abscesses, the air cannot possibly get to the parts, so as to have any share in making them suppurate.

In cases of emphysema, when the air is diffused over the whole body, no suppuration is the consequence, unless an exposure or imperfection of some internal surface should be made, for the purpose of allowing the air to escape. A stronger proof, that it is not the admission of air, which makes parts inflame, is, that the cells in the soft parts of birds, and many of the cells and canals of their bones, communicating with the lungs, and always containing air, never inflame; but if these cells are exposed in an unnatural way, then the stimulus of imperfection is given, these cavities then inflame, and their surfaces either form adhesions together, or produce pus. (*Hunter.*)

When the interior of an abscess is examined, the cavity which contained the matter is observed to be lined with a smooth, membranous-looking substance, which is of a whitish ash-colour, and has a strong resemblance to coagulating lymph. This membrane-like substance has been termed the *sac* or *cyst* of the abscess. This sac or cyst seems in general to adhere by a vascular union to the surrounding cellular membrane, which is itself likewise denser in texture, and more vascular than in the natural state, (*Thomson's Lectures, p.* 310.) its cells being closed by coagulating lymph, effused in consequence of that species of inflammation which Mr. Hunter termed the adhesive. Thus by the formation of a cyst, and the effusion of coagulating lymph in the cellular substance around the abscess, the collection of matter is bounded, and cannot become diffused, as it otherwise would do, in the communicating cavities of the cellular membrane, like the water in œdema.

Something like this diffusion of pus seems to occur in erysipelas phlegmonoides. "But in this case, (says Professor Thomson) the vitality of greater or less portions of the cellular substance is destroyed, the deadened portions are converted into dirty, whitish, ash-coloured sloughs, and it becomes extremely difficult to say, whether any part of the pus contained in the deadened cellular membrane has been formed in the cells, in which it is contained, or has been absorbed into these cells, after being separated from the parietes of the cavities containing the sloughs themselves." (*Lectures, &c. p.* 310.)

There can be no doubt, that after an abscess has received a membranous lining or cyst, the secretion of pus is continued from the surface of the latter part entirely, as well as whatever degree of absorption of the same fluid happens to be going on. In fact, the cysts must be both secreting and absorbing surfaces. The circumstances which leave no doubt of this point, are the frequent, sudden, or gradual removal of very large manifest collections of matter; the continual changes occurring in the quantity and consistence of the pus; and the speedy filling of the cavity with purulent matter again after the first contents of the abscess have been discharged.

Another thing which is yet a subject of controversy is, whether suppuration ever happens unpreceded by inflammation? Professor Thomson, of Edinburgh, believes that the affirmative opinion on this point was first suggested by De Haen of Vienna; but he thinks that much of the difference of sentiment in this matter has proceeded from the vague "notions entertained with regard to the symptoms which necessarily characterize the state of inflammation, and also with regard to the properties by which pus is to be distinguished from other animal fluids. Accordingly, in almost all the examples which De Haen has adduced to prove the formation of pus, without the previous existence of inflammation, he has himself occasion to remark the exudation of coagulating lymph, and the existence of preternatural adhesions; phenomena which we know are produced by that state, which Mr. Hunter denominated adhesive inflammation." But De Haen uses the term inflammation to express that state, which we denominate ulceration, or ulcerative absorption; for in speaking of the cases of suppuration, which he has adduced, he observes, that "in many of them no previous loss, or consumption of substance could be perceived." An observation similar to this was made about the same time, or perhaps a little earlier, by Dr. William Hunter, and an account given of it in the second volume of the London Medical Observations and Inquiries.

"Mr. Hunter, though he endeavours to establish it as an invariable fact, that no suppuration takes place, which is not preceded by inflammation, is of opinion, that collections of what he terms extraneous matter, something like pus, may form in various parts of the body, without the previous existence of inflammation in the parts in which it is formed; and accordingly you will find, at page 300 of his Treatise on Inflammation, a chapter entitled, 'Of Collections of Matter without Inflammation.'"

Professor Thomson doubts, however, "whether these collections of matter, said to be formed without inflammation, would not have been more properly denominated scrofulous abscesses, or chronic suppurations. I am disposed to believe (says he,) that, in whatever texture or organ of the body scrofula manifests itself, there inflammation will be found to exist. The phenomena, it is true, of inflammation, both local and constitutional, are modified by the existence of the scrofulous diathesis; but they are, I believe, always present in such a degree as to justify us in giving to them the name of inflammation, and in classing most, if not all, local scrofulous affections, among inflammatory diseases. When the indolent swellings, of which Mr. Hunter speaks, occur near to the surface of the body, that part feels warmer than usual, as may be felt in white swellings of the joints. The swelling also is either preceded or accompanied with some degree of pain, though, when the affection is internal, the patient may not always be very accurate with regard to the precise seat of this pain. When cut into, the parts also affected with scrofulous swellings are always found more vascular than usual; in short, all the symptoms occur by which the state of inflammation is characterized." (See *Thomson's Lectures on Inflammation, p.* 313, 314.) In another place, this author admits that the matter, which is formed in chronic suppurations, does not always accurately resemble that which is formed in acute abscesses; but yet he contends that it is so analogous both in its physical and chymical characters, as well as in the circumstances in which it is produced, that he can see no reason why it should not be called pus, or a puriform fluid. (*P.* 315.)

QUALITIES OF PUS.

True pus has certain properties, which, when taken singly, may belong to other secretions, but which, conjointly, form the peculiar character of this fluid, viz. globules swimming in a fluid, which is coagulable by a solution of the muriate of ammonia, which no other animal secretion is, and at the same time a consequence of inflammation.

The colour and the consistence of pus are the two qualities, which first attract the notice of every, the most superficial observer. The colour arises from the largest portion of this fluid being composed of very small round bodies, very much like the globules of cream. The fluid in which the globules of pus swim, might at first be supposed to be the serum of the blood, for it coagulates with heat like the latter fluid. Pus is also probably mixed with a small quantity of coagulating lymph; as it partly coagulates after it is secreted. However, the fluid part of pus is found to have properties which serum has not. There being a similarity between pus and milk, experiments have been made to ascertain whether the fluid of pus could be coagulated with the gastric juice of animals: but no coagulation could be effected in this manner; a solution of muriate of ammonia made the fluid part of pus coagulate; but not any other secretion or natural fluid; and hence it was concluded, that whenever globules were found swimming in a fluid, coagulable by muriate of ammonia, the matter was to be considered as pus. (*Hunter.*)

The proportion which the white globules bear to the other parts of pus, depends on the health of the parts producing the discharge. When the globules are very abundant, the matter is thicker and whiter, and is called healthy pus; the meaning of which is, that the solids which produced it are in good health; for these appearances in the matter are no more than the result of certain salutary processes going on in the solids, the effect of which processes is to produce the disposition, on which both suppuration and granulation depend. (*Hunter.*)

Pus is specifically heavier than water, and is probably about as heavy as blood.

Besides the above properties, pus has a sweetish mawkish taste, very different from that of most other secretions, and the same taste takes place, whether it is pus from a sore, or an irritated inflamed surface.

Pus has a smell in some degree peculiar to itself; but this differs in different cases. Some diseases, it is said, may be known by the smell, as for instance, a gonorrhœa.

Pus sinks in water; mucus floats. Pus communicates to water an uniformly troubled white colour; mucus gives the appearance of stringy portions floating in it. Mucus is said to be more readily dissolved by sulphuric acid than pus is. It has also been asserted, that if water be added to such solutions, the pus is precipitated to the bottom of the vessel; while the mucus, instead of being completely precipitated, forms swimming flakes. A solution of caustic alkali dissolves both pus and mucus; but when water is added, the pus is said to become separated, but not the mucus.

Though solutions in chymical menstrua and precipitations, have been thought a test of the distinction between these two fluids, yet the method has been thought absurd and unphilosophical. It has been conceived, that all animal substances whatever, when in solution, either in acids or alkalies, would be in the same state, and therefore, that the precipitation would be the same in all. Calcareous earth, when dissolved in muriatic acid, is in that acid in the same state, whether it has been dissolved from chalk, limestone, marble, or calcareous spar, and precipitations from all are the same. Hence, experiments were made on organic animal matter, such as muscles, tendon, cartilage, liver, and brain; and on inorganic, such as pus and the white of an egg. All these substances were dissolved in sulphuric acid, and precipitated with potassa. Each precipitation was examined with such magnifiers, as plainly showed the forms of the precipitates, all which appeared to be flaky substances. The precipitate by ammonia had exactly the same appearance. The same appearances were seen, when the above kinds of animal matter were dissolved by caustic potassa, and precipitated with the muriatic acid. A flaky substance, void of any regular form, composed each precipitate. (*Hunter.*) For additional observations on the tests of pus, and an account of those suggested by Dr. Young and Grasmeyer, see the *First Lines of the Practice of Surgery, Vol.* 1, *p.* 32, *Ed.* 4.

Pus does not irritate the particular surface which secretes it, though it may be very irritating to any other. Hence, no suppurating surface of any specific kind, can be kept up by its own matter; if this had not been the case, no sore of a specific quality, or producing matter of an irritating kind, could ever have been healed. This is similar to every other secretion of stimulating fluids, as the bile, tears, &c. which fluids do not stimulate their own glands, or ducts, but are capable of stimulating any other part of the body. (*Hunter.*)

Whenever a real disease attacks, either the suppurating surface, or the constitution, the production of true pus ceases, and the fluid becomes changed in some measure, in proportion to these morbid alterations. In general it becomes thinner and more transparent, and it partakes more of the nature of the blood, as is the case in most other secretions under similar circumstances. *Sanies* is the term usually applied by surgeons to pus, in this degenerated state. This unhealthy sort of matter has more of the serum, and frequently more of the coagulating lymph in it, and less of the combination which renders it coagulable by a solution of muriate of ammonia. It has also a greater proportion of the extraneous parts of the blood, which are soluble in water, such as salts; and it has a greater tendency, than true pus, to become putrid. Such unhealthy matter may even be irritating to the surface which produces it.

The discharge, when of an irritating sort, is more stimulating to the adjoining parts with which it comes in contact, than to its own secreting surface. In this manner it frequently produces excoriation of the skin and ulceration. Thus the tears excoriate the skin of the cheek, in consequence of the quantity of salts which they contain. From this effect, matter has been called corrosive, a quality which it has not; the only property which it possesses being that of irritating parts which it touches, so as to cause their absorption. (*Hunter.*)

When the vessels thus lose the power of producing good pus, they also lose more or less the power of forming granulations. This may depend on some deviation from the due structure and action, which such vessels should possess, in order to be qualified for the performance of these two operations.

Pus, from several circumstances, would appear in general to have a greater tendency to putrefaction than the natural juices have; but, perhaps, this is not the case with pure pus, which, when first discharged from an abscess, is commonly perfectly sweet. There are, however, some exceptions to this, but these depend on circumstances entirely foreign to the nature of pus itself. Thus, if the abscess had any communication with the air, while the matter was confined in it; or if the collection has been so near the colon or rectum as to have been infected by the feces, then we cannot wonder that the matter should become putrid. When blood is blended with pus; when sloughs are mixed with it; when the parts forming the seat of the abscess are in a gangrenous state from an erysipelatous affection; the matter has a greater tendency to putrify than the pure pus discharged from sound abscesses or healing sores. Pure matter, though easily rendered susceptible of change, by extraneous additions, is in its own nature tolerably uniform and immutable. It appears so unchangeable, that we find it retained in an abscess for weeks, without having undergone any alteration. These qualities, however, only belong to perfect pus. If a healthy sore inflames, the matter now produced from it, though unmixed with extravasated blood, or dead solids, becomes much sooner putrid, and much more irritating, than the discharge formed before this alteration of the ulcer. (*Hunter.*)

In the preceding paragraph it is stated, that matter remains very often unchanged in abscesses for weeks. This expression of Hunter's is not strictly correct; for it is well known, that the surfaces of the cavities of abscesses are always absorbing, as well as secreting ones; consequently, there must be a continual mutation going on in the contained matter.

When there are diseased bones, or other extraneous bodies, exciting irritation, sometimes even in so great a degree as to make the vessels bleed, and often wounding the vessels of the part, the matter is always found to be very offensive. This state of the discharge is one mark of a diseased bone.

The discharge of an unhealthy sore blackens silver probes, and preparations of lead. This effect is imputed by Dr. Crawford to the sulphurated hydrogen gas, generated in the matter. (*Phil. Trans. vol.* 80, *Year* 1790, *p.* 385.) Further interesting observations on the nature of pus may be found in an Essay on the Differences between Pus and Mucus, by Dr. Darwin, junior; also in Dr. G. Pearson's Paper in Philos. Trans. 1811.

USE OF PUS.

By some it is supposed to carry off humours from the constitution. Suppuration is sometimes regarded as a constitutional disease, changed into a local one, which constitutional malady is discharged, or thrown out of the body, either in the form of pus, or together with this fluid. Critical abscesses have been thought to be cases of this sort. Suppuration has also been imagined to carry off local complaints from other parts of the body, on the old principle of derivation or revulsion. For this reason, sores or issues are made in sound parts before allowing other sores to be dried up. Suppuration is sometimes excited with a view of making parts, such as indurated swellings, dissolve into pus; but I have endeavoured to show, that no dissolution of the solids is concerned in the production of pus.

A secretion of pus is looked upon as a general prevention of many, or of all the causes of disease. Hence, issues are made to keep off both universal as well as local diseases. However, the use of pus is perhaps unknown; for it is formed most perfectly from healthy sores, and in healthy constitutions; and large discharges from parts not very essential to life, produce very little change in the constitution, and as little upon being healed up, whatever some may suppose to the contrary. (*Hunter.*)

This is certainly the case with many old ulcers, the suppuration from which seems to have little or no effect in impairing the health. Nor is there any real reason to be afraid of healing such ulcers, when possible, lest a worse disease should follow from the stoppage of a discharge to which the system is supposed to be so habituated that the continuance of it must be essential to health.

Every one knows, that when there is no interference of art, that is, when the surface of a sore is left uncovered, the thin part of the matter evaporates, and the thick part dries and forms a scab. Nature, therefore, seems to have designed that one use of pus should be to make a cover, or protection for ulcerated surfaces. But I cannot agree with what has been asserted, (*Hunter*) that the natural healing of a sore under a scab takes place more quickly than when surgical dressings are employed.

On ulcers, as would appear from modern microscopical observations, "the coagulated pus is rendered tubular by the extrication of its carbonic acid gas, and that these tubes, or canals, are immediately filled with

-red blood, and thus connected with the circulation." If this point be established, Sir Everard Home conceives that there will then be little difficulty in making out the succeeding changes, by means of which the coagulated pus afterward becomes organized. (*On the conversion of Pus into Granulations, or new Flesh, in Phil. Trans. Vol.* 109, *p.* 109, *Lond.* 1819) These statements are curious, and ought to have been noticed in the article *Granulations*, to which they more immediately relate.

Among the secondary uses of suppuration, may be mentioned, opening a communication between a disease and the external surface of the body; forming a passage for the exit of extraneous bodies, &c.

TREATMENT WHEN SUPPURATION MUST TAKE PLACE.

In cases of inflammation, arising from accident, but so circumstanced that we know suppuration cannot be prevented, the indication is to moderate the inflammation, which, if the powers are great, and the injury done considerable, will probably be very violent. If the constitution should also be much affected, certain general means are proper, such as bleeding, purging, and nauseating medicines. While the constitution continues to be disturbed, suppuration cannot take place in the most favourable manner. In these cases, also, such medicines as produce a gentle perspiration greatly relieve the patient, for instance, the pulv. ipecac. comp.; antimonials; aq. ammon. acet.; saline draughts, &c. Opiates may produce a temporary diminution of action; but it is not always the consequence of this medicine, as there are constitutions which it renders more irritable, and of course where it aggravates the inflammatory action.

The applications to inflammations, which are to suppurate and form an abscess, commonly used, are poultices and fomentations. These, however, appear to be applied without much critical exactness or discrimination; for they are applied before suppuration has taken place, and when this event is not desired; and they are also applied after suppuration has taken place. With respect to suppuration itself, abstracted from all other considerations, the indication cannot be the same in every state; but if poultices and fomentations are found to be of real service in the two stages of the disease, there must be something common to both, for which they are of service, independently of simple suppuration. Poultices are useful when the inflammation attacks the skin, either in the first instance or after an abscess has approached so near the skin that this becomes secondarily affected. This benefit appears to arise from the skin being kept soft and moist. Such is the use of a poultice in inflammation, either before or after suppuration, until the abscess is opened. But, when poultices and fomentations are applied to inflamed parts, in which we wish to avoid suppuration, reason and principle will not justify the practice, though such applications may be proclaimed by experience to be very proper. (*Hunter.*)

TREATMENT AFTER SUPPURATION HAS TAKEN PLACE.

When suppuration cannot be stopped, or resolved, it is in general to be promoted.

How far suppuration can be usefully promoted by medicines or applications, is questionable; but attempts are generally made, and, for this purpose, suppurating cataplasms and plasters, composed of the warm gums, seeds, &c. were formerly much recommended. Mr. Hunter doubted, whether such applications had any considerable effect in the way intended; for, if they were put on a sore, they would hardly increase the discharge from it, and perhaps even diminish it. However, in many cases in which the parts are indolent, and hardly admit of true inflammation, in consequence of which a perfect suppuration cannot take place, stimulating the skin brings on a more salutary, and of course a quicker inflammation. Thus the antimonial ointment, and blistering the skin, over chronic swellings and abscesses, are sometimes indicated.

These applications have been found, however, to bring the matter more quickly to the skin, even in the most rapid suppurations. This effect has been mistaken for an increased formation of pus; but this consequence can only follow in cases in which the inner surface of the abscess is within the influence of the skin. The accelerated progress of the matter to the surface of the body arises from another cause, viz. the promotion of ulceration in the parts, between the collection of matter and the cuticle.

Emollient poultices are commonly applied to inflamed parts, when suppuration is known to have taken place. These can have no effect upon suppuration, except that of lessening the inflammation, or rather making the skin more easy. The inflammation must have reached the skin before poultices can have much effect, for they can only affect that part. The ease of the patient, however, should be considered, and we find that fomentations and poultices are often beneficial in this way. By keeping the cuticle moist and warm, the sensitive operations of the nerves of the parts are soothed. On the contrary, if the inflamed skin is allowed to dry, the inflammation is increased, and as suppuration is probably not checked by the above treatment, it ought to be put in practice. As warmth excites action, the fomentation should be as warm as the patient can bear without inconvenience. (*Hunter.*)

"The local treatment in phlegmonous abscesses (as professor Thomson observes) is still more simple than that by which we endeavour to procure resolution. It consists almost solely in the application of a moderate degree of warmth and moisture to the inflamed part, either by means of fomentations or poultices. The manner in which these means act in promoting suppuration is unknown. Independently of their temperature, it seems very doubtful whether fomentations and poultices have any power of promoting suppuration in the parts to which they are applied. They keep the cuticle moist and warm, they promote perspiration, they sooth and allay pain in many inflammations, and these are probably the only immediate effects which they produce. The rest is the work of nature. In suppurations, attended by very severe pain, the use of warm fomentations is often found to afford singular relief, not only by their effect in easing pain, but also by their seeming to shorten the duration of the suppurative stage. In the cases of suppuration, in which they give relief, they should be repeated every four or six hours. The most common way of employing them is by wringing linen, or woollen cloths, out of warm water, and applying these to the inflamed part, of as high a temperature as the feelings of the patient can bear. Decoctions of herbs were formerly much employed in the way of embrocation, and were then, and are still, by many practitioners, supposed to possess peculiar virtues in promoting suppuration. Whether embrocations with the narcotic herbs might not in some cases be beneficial, by producing a sedative effect in allaying pain, I am unable to say, though I am inclined to believe that even they act chiefly by their warmth and moisture. In cases where you find it necessary to use an embrocation with herbs, the flowers of chamomile may in general be substituted in place of the leaves or flowers of almost every other plant. These flowers readily imbibe and retain moisture. They are, when moist, of a soft consistence, and can be easily moulded to the figure of the parts to which they are applied." (*Thomson's Lectures, p.* 333.) Oatmeal, crumb of bread, and especially linseed meal, are the ingredients mostly preferred in this country for emollient poultices. When bread is used, it is generally boiled in milk. The observations, however, which have been offered on poultices in another place, are here equally applicable. (See *Inflammation.*)

OF THE TIME WHEN ABSCESSES SHOULD BE OPENED.

As abscesses, wherever formed, must increase that part of their cavity which is next to the skin, more quickly than the bottom, they must become, in some degree, tapering towards the latter part, with their greatest breadth immediately under the skin. This shape of an abscess, when allowed to take place, is favourable to its healing, for it puts the bottom, which is the seat of the disease, more upon a footing with the mouth of the abscess than it otherwise could be. As the bottom, or part where the abscess began, is more or less in a diseased state; and as the parts between the seat of the abscess and the external surface are sound parts, having only allowed a passage for the pus, they, of course, have a stronger disposition to heal than the bottom has.

To keep the mouth of an abscess from healing before its bottom, the collection of matter should be allowed to break of itself; for although abscesses in general only open by a small orifice, more especially when sound, yet, in such cases, the skin over the general cavity of the matter is so thinned, that it has very little tendency to heal, and often ulcerates and makes a free opening. If the latter event should not spontaneously occur, it may now be more easily obtained by the interference of the surgeon.

Abscesses which are the most disposed to heal favourably, are the quickest in their progress to the skin, and the matter comes to the surface almost at a point; the swelling is not so conical as in other cases, and when it bursts the orifice is exceedingly small. On the other hand, when there is an indolence in the progress of the abscess, the collection spreads more, or distends the surrounding parts in a greater degree, in consequence of their not being so firmly united by inflammation in the one as they are in the other instance; nor will ulceration so readily take the lead, and the matter will come to the skin by a broad surface, so as to thin a large portion of the cutis. (*Hunter.*)

It may be set down as a general axiom, that all phlegmonous abscesses should be allowed to break, and not be opened by the surgeon. When punctured unnecessarily, or prematurely, they never heal so favourably as when left to themselves.

Particular cases, however, should be opened as soon as the existence of matter is ascertained. Abscesses should only be allowed to burst of themselves, when the confinement of the matter can do no mischief. Abscesses in the abdomen or thorax, under the cranium, near the eye, or in joints, should be mostly opened very soon. When suppuration takes place beneath ligamentous expansions, or aponeuroses, which invariably retard the progress of the matter to the surface of the body, an early opening should be made. If this be not done, the matter spreads to a great extent, separating such ligamentous expansions from the muscles, and the muscles from each other, and, as the pus cannot get to the surface of the body, the length of the disorder is of course increased. When matter is so situated as to be liable to insinuate itself into the chest or abdomen, or into the capsular ligaments of the joints, it is highly proper to prevent this extension of mischief, by making a timely opening into the abscess.

"Those abscesses ought to be opened early, (says Professor Thomson) that are situated in parts through which the matter is liable to become widely diffused. This is particularly the case with abscesses that are situated on the forepart of the neck, or in the cavity of the axilla, or by the side of the rectum. When matter is formed in the cavity of the axilla, if it does not speedily obtain an external outlet, it is very liable to pass up towards the clavicle in the course of the axillary plexus of nerves and vessels, or forwards under the pectoral muscle. I have repeatedly seen axillary abscess take both of these directions at the same time, forming one of the most painful and difficult cases to treat which occurs in the management of abscesses." Dr. Thomson also considers an early opening proper and necessary, where the matter is lodged, as in some cases of whitloe, in the sheaths of the tendons; where matter is formed under the periosteum; where it collects under fasciæ, or in the vicinity of large arteries, joints, or the greater cavities of the body: also when the abscess is deep-seated. (See *Thomson's Lectures on Inflammation, p.* 336—338.)

With respect to making an early opening into abscesses, situated near large arteries, I am not aware, that any danger of the artery ulcerating in consequence of the nearness of the pus, really exists. Therefore, some doubts may reasonably be entertained of Professor Thomson's advice in this particular case, as the general rule of opening abscesses near large blood-vessels, in an early stage of the disease, would be objectionable on the ground of the practice exposing the vessels themselves to injury. Indeed, this well-informed writer distinctly mentions, in considering the subject in question, that the arteries are not very susceptible of ulcerating absorption. (P. 337.)

OF THE PLACE WHERE THE OPENING SHOULD BE MADE.

If a free opening is not required, or making one is not practicable, it is at least proper to make whatever opening can be made in a depending situation. By this means the matter will more readily escape, and all pressure arising from the confinement or lodgment of pus, will be prevented. A very small degree of pressure on that side of the abscess which is next to the skin, may produce ulceration there; and although such pressure might not, in many cases, be so great as to produce ulceration at the bottom of the abscess; yet it might be sufficiently great to prevent granulations from forming on that side, and thereby retard the cure, as no union can take place, but by means of granulations. The pressure is always most, and retards the formation of granulations in the greatest degree, at the most depending part of the abscess. Hence, if no opening be made in this situation, the upper part of the abscess readily heals to a small point, which becomes a fistula.

When circumstances forbid making an opening at the most depending part of an abscess, perhaps nothing more can be done, than to evacuate the matter as often as necessary, and gently to compress the sides of the abscess together, when the situation of the case admits of the practice.

But abscesses are not always to be opened at the most depending part. The distance between the matter and the skin at this part is the common reason against the method. If an abscess is rather deeply situated, and points in a place which is higher than where the collection lies, it is proper to make the opening where the conical eminence, or as it is termed, the *pointing* appears. Thus, if an abscess should form in the centre of the breast, and point at the uppermost part, which is often the case, it would be improper to cut through the lower half of the mamma, in order to make a passage for the matter in that direction. If an abscess should form on the upper part of the foot, it would be wrong to make an opening through the sole of the foot to get at the most depending part of the abscess; for, besides cutting such a depth of sound parts, a great many useful ones would be destroyed.

When the abscess does not point in a depending situation, as in the instances just cited, since the place where the matter threatens to open a passage is likely to be the future opening, and this situation is disadvantageous to the healing of the deep part of the abscess, it is generally best to let the collection of matter first burst of itself. and then dilate the opening as freely as necessary. By allowing abscesses to burst spontaneously, the opening is not so apt to heal as if made by art, and therefore, is better in such situations. (*Hunter.*)

In most cases, it is more advantageous even to cut through a certain thickness of parts, for the sake of obtaining a depending opening, than to make an opening, where the pointing appears, that is, where the parts are thinnest, and the matter nearest the surface. This remark is highly worthy of remembrance, when there is no doubt of the existence of matter at the depending place, and when the parts to be divided are not important ones. Collections of matter beneath the fasciæ of the fore-arm and thigh particularly demand attention to this direction, as they commonly point where those ligamentous expansions are thinnest, not where the matter can most readily escape.

Abscesses in the sheath of the rectus abdominis should also be opened in a low situation.

DIFFERENT METHODS OF OPENING ABSCESSES.

All abscesses will naturally burst of themselves, unless the matter be absorbed, and, in general, they ought to be allowed to take this course. There are, however, as I have already explained, particular circumstances which require an early opening; but, when the skin over the abscess is very thin, it is not of so much consequence, whether the case be permitted to burst of itself. or it be opened by the surgeon.

When abscesses are large, it is generally necessary to open them by art, whether they have burst of themselves or not; for, the natural opening will seldom be sufficient for the completion of a cure; and, although it may be sufficient for the free discharge of the matter, yet these abscesses will heal much more readily when a free opening is made; for, the thin skin over the cavity granulates but indifferently, and therefore unites but slowly with the parts underneath. (*Hunter.*)

Abscesses may be opened either by an incision or by making an eschar with caustic. To the latter plan, however, many urge strong objections: the use of caustic is not usually attended with any advantage which may not be obtained by a simple incision; upon a tender inflamed part it gives much more pain; it is more slow in its effects; and the surgeon can never direct the operation of the caustic so accurately as to destroy exactly the parts which he wishes, and no more. If the eschar be not made deeply enough, the lancet must, after all, be used. Caustic also leaves, after its application, a disagreeable scar, a consideration of some importance in opening abscesses about the female neck or face. To these numerous objections we have to add, that the eschar is, very frequently, ten or twelve tedious days in becoming detached.

When there is a redundance of skin, or when there is a good deal of it thinned, however, an opening made with caustic will answer, perhaps, as well as an incision. The application of a caustic may also sometimes be advantageously resorted to when there is a good deal of indolent hardness around a small abscess.

The *calx cum potassa*, or the *potassa* alone, is the best caustic for opening abscesses. The part is first to be covered with a piece of adhesive plaster, which has a portion cut out exactly of the same figure and size as the opening intended to be made in the abscess. The best way of making the eschar is to dip the end of the caustic in water, and to rub it on the part till the skin becomes brown. The active substance is then to be immediately washed off with some wet tow, the plaster is to be removed, and an emollient poultice applied.

In almost all cases, it is better to use the lancet, or double-edged bistoury. Either of these instruments opens the abscess at once, and with less pain, than results from the use of caustic; it occasions no loss of substance, consequently a smaller cicatrix; and, by using it, the opening may be made in the most advantageous direction, and of the exact size required.

DRESSINGS AFTER OPENING ABSCESSES.

When an abscess has burst of itself, and it is unnecessary to enlarge the opening, the only thing requisite is to keep the surrounding parts clean. The continuation of the same kind of poultice, which was before used, is, perhaps, as good a practice as any; and when the tenderness, arising from the inflammation, is over, lint and a pledget may be made use of, instead of the poultice.

But, an abscess, opened by a cutting instrument, is both a wound and a sore, and partakes more of the nature of a fresh wound in proportion to the thickness of the parts cut. Hence, it is necessary that something should be put into the opening to keep it from healing by the first intention. If it is lint, it should be dipped in some salve, which will answer better than lint alone, as it will allow of being taken out sooner. This is advantageous, because such sores should be dressed the next day, or at latest on the second day, in order that the pus may be discharged again. When the cut edges of the opening have suppurated, which will be in a few days, the future dressings may be as simple as possible, for nature will, in general, complete the cure.

If the abscess has been opened with caustic, and the slough has either been cut out or separated of itself, the case is to be regarded altogether as a suppurating sore, and dressed accordingly.

Perhaps, dry lint is as good a dressing as any, till the nature of the sore is known. If it should be of a good kind, the same dressing may be continued; but, if not, then it must be dressed accordingly. Parts, which at first appear to be sound, sometimes assume every species of disease, whether from indolence, from irritability, from scrofulous, and other dispositions. This tendency to disease arises, in some cases, from the nature of the parts affected, as, for instance, bone, ligament, &c. (*Hunter.*)

Consult particularly John Hunter's Treatise on the Blood, Inflammation, and Gunshot Wounds, a work, in which more interesting knowledge respecting Abscesses and Suppuration is contained, than in any other ever published. See also *Traité de la Suppuration de F Quesnay*, 1749. *J. Grashuis, A Diss. on Suppuration, 8vo. Lond.* 1752. *Various parts of the Mémoires de l'Academie de Chirurgie. J. B. Boyer, De Suppuratione et Curatione Inflammationis per Suppurationem terminandæ. Monsp.* 1766. *L'Encyclopédie Méthodique, Partie Chirurgicale; article Abcès. Dissertations on Inflammation by John Burns,* 1800. *Sir E. Home's Dissertation on the Properties of Pus,* 1788; *and his Pract. Obs. on Ulcers, 2d Edit.* 1801. *James Hendy, Essay on Glandular Secretion, containing an experimental Inquiry into the Formation of Pus, &c. 8vo. Lond.* 1775. *N. Romayne, De Puris Generatione, 8vo. Edinb.* 1780. *C. Darwin's Experiments, establishing a criterion between mucilaginous and purulent matter, &c. Litchfield,* 1780. *P. Clare, Essay on Abscesses. Lond.* 1781. *Several parts of Pott's Chirurgical Works, but especially his Treatise on the Fistula in Ano. T. Brand, Strictures in Vindication of some of the Doctrines misrepresented by Mr. Foot in his two pamphlets, entitled "Observations upon the new opinions of J. Hunter, in his Treatise on the Venereal, including Mr. Pott's Plagiarisms, and misinformation an*

Pus," &c. 4to. *Lond.* 1787. *Richter, Anfangsgründe der Wundarzneykunst, B.* 1, *Kap.* 2. *Dr. J. Thomson's Lectures on Inflammation, p.* 305, &c. *Edinb.* 1813; *a work, in which a profound knowledge of medical science, and of surgery in particular, is every where conspicuous. J. F. Crevecœur, De Diagnosi Puris; Longchamps,* 1798. *Pearson's Principles of Surgery, p.* 34, &c. *Edit.* 2. *Lassus Pathologie Chirurgicale, T.* 1, *p.* 21, &c. &c. *Edit. of* 1809. *Seb. J. Brugmans, De Puogenia, sive mediis quibus natura utitur in creando pure,* 8vo. *Groningæ,* 1785. *Dr. G. Pearson's Obs. and Experiments on Pus in the Philosophical Trans. for* 1811. *C. J. M. Langenbeck, Von der Behandlung der Fistelgänge, der Schusscanale, und grosser Eiter absondernder Höhlen, in Neue Bibl. für die Chirurgie,* 12mo. *Hanover,* 1817.

SURGERY, or CHIRURGERY, (derived from chirurgeon, from χειρ, the hand, and εργον, work,) has been by many considered to be that branch of medicine, which principally effects the cure of diseases by the application of the hand alone, the employment of instruments, or the use of topical remedies. (*Encyclopédie Méthodique, Partie Chir. Tom.* 1, *Art. Chirurgie.*) But, although this definition certainly conveys to us some idea of the nature of this most useful profession, it is not entirely accurate as applied to the present state of practice. It might, indeed, be correct during that short unfavoured period of surgery upon the continent, some centuries ago, when its practice was denounced by the Council of Tours, as unfit for the hands of priests and men of literature, and when the surgeon became little better than a sort of professional servant to the physician, the latter alone not only having the sole privilege of prescribing internal medicines, but even that of judging and directing when surgical operations should be performed. Then the subordinate surgeon was only called upon to execute with his knife, or his hand, duties which the more exalted physician did not choose to undertake; and, in fact, he visited the patient, did what was required to be done, and took his leave of the case altogether under the orders of his master. In modern times, however, the good sense of mankind has discovered that surgery is deserving of an eminent rank among such arts as ought to be cultivated for the general benefit of society; that the man who is not himself accustomed to the performance of operations, cannot be the best judge of their safety and necessity; and that, in every point of view, the surgical practitioner merits as much favour and independence in the exercise of his profession, as he whose avocation is confined to physic. Hence, the surgeon is now exclusively consulted about many of the most important diseases to which the human body is liable. Being no longer under the yoke of the physician, he follows the dictates of his own judgment and knowledge; he prescribes whatever medicines the case may demand, internal as well as external; and under the encouragement of an enlightened age, he sees his profession daily becoming more scientific, more respected, and more extensively useful.

By some writers, physic is said to have for its object the treatment of internal, surgery that of external diseases. This definition, however good and plausible it may at first appear, can only be received with numerous exceptions in regard to modern surgery: for instance, the psoas abscess, stone in the bladder, an extravasation of blood within the skull in consequence of accidental violence, are universally allowed to be strictly chirurgical cases; yet no man in his senses would call these disorders external.

Others have defined surgery to be the mechanical part of physic, "*quod in therapeia mechanicum;*" but, although this has obtained the assent of so eminent a modern surgeon as Professor Richerand, of Paris, (*Dict. des Sciences Medicales, Tom.* 5, *p.* 85.) I believe few on this side of the water will be of his opinion. As Mr. John Pearson has observed, "Many people have imagined that when a man has learnt the art of dressing sores, of applying bandages, and performing operations with a little dexterity, he must necessarily be an accomplished surgeon. If a conclusion so gross and fallacious had been confined to the vulgar and illiterate, the progress of scientific surgery would have suffered little interruption; but if young minds are directed to these objects, as the only important matters upon which their faculties are to be exercised; if the gross informations of sense constitute the sum of their knowledge, little more can be expected from such a mode of study, than servile imitation, or daring empiricism. Indeed, some people have affected to oppose surgery as an *art*, to medicine as a *science;* and if their pretensions were justly founded, the former would certainly be degraded to a mere mechanical occupation. But it is not very easy to comprehend the grounds of such a distinction. The internal and external parts of the body are governed by the same general laws during a state of health; and, if an internal part be attacked with inflammation, the appearances and effects will bear a great similarity to the same disease situated externally; nor are the indications of cure, in general, materially different. If by science, therefore, be meant 'a knowledge of the laws of nature,' he who knows what is known of the order and method of nature, in the production, progress, and termination of surgical diseases, merits as justly the title of a scientifical practitioner as the well-educated physician. The practical parts of physic and surgery are very frequently disunited; but their theory and principles are indivisible, since they truly constitute one and the same science." (*Pearson's Principles of Surgery, Preface.*)

But, though we can object on good grounds to the above-mentioned definitions of surgery, it seems impossible to offer any other, against which equal objections could not be brought. In fact, how is it possible to define surgery with any degree of accuracy, until the boundaries between it and physic can be determined? Richerand talks indeed of the Medical School of Paris having now successfully established the limits and objects of surgery, and he boasts of this as an original improvement reflecting credit on his countrymen. (See *Dict. des Sciences Med. T.* 5, *p.* 88.) Yet, what are we to think, when we remember, not only that he has, in the commencement of the very same article, defined surgery to be "*quod in therapeia mechanicum*," but that by way of illustrating what the Parisian School has accomplished, he says, that surgery was first demonstrated by it to be only a means of physic, and not a separate and distinct science? (See also *Dict. des Sciences Med.* article *Chirurgicales, Maladies.*)

As a learned Professor notices, the limits between physic and surgery are not very precisely marked, and the respective functions of the physician and surgeon, long as those names have existed, are still but very inaccurately defined. "The most superficial acquaintance with the symptoms, progress, and termination of the various morbid affections to which the human body is liable, must be sufficient to convince every unprejudiced inquirer, that there is but a slight foundation, if indeed there be any, for this distinction, in the nature of the diseases, which these practitioners are required to treat, or in the modes of treatment, by which the diseases themselves may be cured or relieved. Experience has long shown, that the use of internal remedies is not only required in a large proportion of the diseases, which are regarded as strictly chirurgical, but also, that there are few diseases, which come under the care of the physician, in which morbid affections, requiring the manual aid, or practical skill of the surgeon, do not frequently occur.

"The treatment of febrile and internal inflammatory diseases, it will be allowed, belongs exclusively to the province of the physician, wherever the distinction between physician and surgeon has been introduced, and is rigidly observed; yet, in some species of fevers, and in all internal inflammatory diseases, blood-letting is often the principal, if not the only remedy that is required. But this is an operation, however urgent the necessity for it be, which from engagement the physician cannot, and, from the fear of degrading his province of the profession, will not perform. Retention of urine not unfrequently takes place in symptomatic febrile diseases, and this is an affection which does not always yield to the use of internal remedies; but it is an affection also, from the painful uneasiness, which it immediately excites, as well as from the danger which it threatens, that will not admit of delay. When internal remedies, therefore, fail in relieving the patient, the urine must be speedily drawn off by means of a chirurgical operation; otherwise inflammation, mortification, and rupture of the bladder, must necessarily ensue. Febrile and internal inflammatory affections terminate not unfrequently in the formation of fluids, which it is necessary to let out by a chirurgical operation; and abscesses, fistulous openings, and ulcers are formed, which require the aid of the surgeon. In patients, also, affected with severe febrile diseases, from being long fixed down to their beds in one position, some of the parts of the body, upon which they rest, occasionally acquire a disposition to mortify, larger or smaller portions of the skin and subjacent cellular membrane becoming dead, separate from the living parts, and sores are formed, which are but too often the subject of unavailing chirurgical practice. To employ, in the different stages of this species of mortification, from its first commencement to the complete separation of the dead parts, and the formation of a new skin, the appropriate external and internal remedies, requires a greater share of chirurgical skill than can reasonably be expected in those who make a profession solely of physic. Unhappy, therefore, must be the lot of that patient, who in circumstances similar to those which I have described, has the misfortune to have for his sole medical attendant, a physician ignorant of surgery.

"But (continues Professor Thomson,) if a knowledge of surgery be necessary to the student who intends to practise physic, the knowledge of physic, on the other hand, is no less necessary to him who intends to devote his attention exclusively to the profession of surgery; for, indeed, there are few chirurgical diseases, which are not in some period or another of their existence, accompanied by mobid affections of the same nature with those which fall properly, and most frequently under the care of the physician. It will only be necessary to mention, as examples of these affections, the symtomatic fever, which attends inflammation, whether this affection has been induced by external injury, or has occurred spontaneously in the body from internal disease; the hectic fever, supervening to long-continued processes of suppuration; the febrile state and other morbid affections, which are sometimes brought on by the too sudden and injudicious use of mercury; bilious fevers, and the various derangements of the digestive organs, which are sometimes the cause, and at other times the consequence, of local diseases; the nervous affections, such as apoplexy, convulsions, paralysis, and mania, which arise not unfrequently from injuries of the head; and locked jaw, or tetanus, which, in warm climates particularly, is so very liable to be induced by punctured wounds. These are morbid affections, the proper study and treatment of which, when they occur without local injury, are supposed to belong to the physician, rather than the surgeon; but occuring very frequently as they do in chirurgical diseases, and always modifying, or aggravating, the effects of these diseases, ignorance of their nature, relations, and modes of cure, is not only inexcusable, but highly criminal in the practitioner, who ventures to undertake their treatment." (*Thomson's Lectures on Inflammation, Introduction.* Also *J. R. C. Bollman, Tentamen, ostendens Chirurgiam a Medicina haud impune separari,* 12mo. *Rintel,* 1803.)

From what has been stated, I think it very certain, that there never can be a complete scientific division of the healing art into physic and surgery; and that all attempts to distinguish the numerous diseases and injuries of the human body into medical and surgical cases, must in a great measure be decided by custom, and the mutual agreement of practitioners, rather than by any rules, or principles, which are at all consistent.

In the earliest periods, the same men cultivated the whole field of medicine. The writings of Hippocrates, Galen, Celsus, Paulus Œgineta, Albucasis, &c. prove that the Greeks, Romans, and Arabians never had an idea of the human body being susceptible of only two classes of diseases, one of which formed the province of physic, while the other constituted a separate and distinct science called surgery. All these ancient authors treat successively of fevers, fractures, wounds, and nervous diseases, and none of them appear to have supposed, that there could be any disorders which really deserved to be called *external,* and others *internal.* Nor was it until the middle of the twelfth century, that the ecclesiastics were restrained from undertaking any bloody operation. Surgery was then rejected from the universities, under the empty pretext, "*Ecclesia abhorret a sanguine,*" often expressed in its decrees, as Professor Thomson well observes, but never acted upon, except in this instance, by the church of Rome. It is to this epoch that we must refer the true separation of physic from surgery, the latter being abandoned to the laity, who, in those ages of barbarism, were totally illiterate.

It is an observation made by the celebrated Bichat, that two things are essentially necessary to form a great surgeon, viz. genius and experience. One traces for him the way, the other rectifies it; both reciprocally assist in forming him. Without experience, genius would be unprofitably fertile; without genius, experience would only be a barren advantage to him. (*Œuvres Chir. de Desault, par Bichat, T.* 1, *Discours Prelim.*) Out of the large number of hospital surgeons, who are to be met with in every country of Europe, and who enjoy ample opportunities of profiting by the lessons of experience, how few distinguish themselves, or ever contribute a mite to the improvement of their profession. Opportunity, without talents and an aptness to take advantage of it, is not of more use than light to a blind man. On the other hand, splendid abilities, without experience, can never be enough to make a consummate surgeon, any more than a man with the greatest genius for painting can excel in his particular art without having examined and studied the real objects which he wishes to delineate. In short, as a sensible writer has remarked, "*Les grands chirurgiens sont aussi rares, que le génie, le savoir, et les talens.*" (*Mém. de l' Acad. de Chir. T.* 1, *Pref. p.* 41, *Edit.* 12*mo.*)

The description of the qualities which a surgeon ought to possess, as given by Celsus, is excellent as far as it goes. A surgeon, says he, should be young, or, at any rate, not very old; his hand should be firm and steady, and never shake; he should be able to use his left hand with as much dexterity as his right; his sight should be acute and clear; his mind intrepid and pitiless, so that when he is engaged in doing any thing to a patient, he may not hurry, nor cut less than he ought, but finish the operation, just as if the cries of the patient made no impression upon him. (*A. C. Celsi Med. Præf. ad lib.* 7.)

By the word "*immisericors,*" as Richerand has observed, (*Nosogr. Chir. Tom.* 1, *p.* 42, *Edit.* 2,) Celsus did not mean that a surgeon ought to be quite insensible to pity; but that during the performance of an operation, this passion should not influence him, as all emotion would then be mere weakness. This undisturbed coolness, which is still more rare than skill, is the most valuable quality in the practice of surgery. Dexterity may be acquired by exercise; but firmness of mind is a gift of nature. Haller, to whom nature was so bountiful, in other respects, was denied this quality, as he candidly confesses. "Although (says he) I have taught surgery seventeen years, and exhibited the most difficult operations upon the dead body, I have never ventured to apply a cutting instrument to a living subject, through a fear of giving too much pain." (*Bibl. Chir.* 1775, *Vol.* 2.)

Surgery may boast of having had an origin, that well deserves to be called noble; for the earliest practice of it arose from the most generous sentiment which nature has implanted in the heart of man, viz. from that sympathetic benevolence, which leads us to pity the misfortunes which we behold, and inspires us with an anxious desire to alleviate them. He who first saw his fellow-creature suffer could not fail to participate in the pain, and endeavour to find out the means of affording relief. Opportunities of exercising this useful inclination were never wanting. In the first ages of the world, man in his destitute state was under the necessity of earning by force or stratagem, a subsistence which was always uncertain, and in the combats into which this sort of life drew him, he frequently met with wounds and other injuries. Wherever the chace was in vogue as a means of livelihood or amusement; wherever broils and contests occasionally arose; and man was the same animal he now is, liable to various diseases and accidental hurts; there must have existed a necessity for surgery; nor can there be a doubt, that the origin of this valuable practice is as ancient, as the exposure of mankind to several of the same kinds of injuries, as befall the human race at the present day. At length wars became more frequent and extensive; wounds were consequently multiplied; and the necessity for surgical assistance was increased, and its value enhanced.

In fact, among the ancients, the profession of medicine and surgery constituted a sacred kind of occupation, and the practice of it belonged only to privileged persons. Æsculapius was the son of Apollo. In the armies, the highest princes gloried in dressing the wounds of those who had fought the battles of their country. Among the Grecians, Podalirius, Chiron, and Machaon, were not only distinguished for their valour, but also for their skill in surgery, as we learn from the poem of the immortal Homer. The value which was placed upon the services of Machaon by the Grecian army may well be conceived from the anxiety which they evinced to have him properly taken care of when he was wounded in the shoulder with a dart. "O Nestor, pride of Greece, (cries Idomeneus) mount, mount upon thy chariot! and let Machaon mount with thee! Hasten with him to our ships; for a warrior, who knows, as he does, how to relieve pain, and cure wounds, is himself worth a thousand other heroes." (See *Iliad*, *lib.* xi.) Hippocrates was one of the first citizens of Greece; he nobly refused all the rich offers of several kings, enemies of his country, to entice him into their service; and, in particular, he disdained to accept those of Xerxes, whom he regarded as a barbarian.

It is in the immortal poems of the Iliad and Odyssey, that we find the only certain traditions respecting the state of the art before the establishment of the republics of Greece, and even until the time of the Peloponnesian war. There it appears that surgery was almost entirely confined to the treatment of wounds, and that the imaginary power of enchantment was joined with the use of topical applications.

In the cures recorded in the sacred writings of the Christian religion, the intervention of a supernatural power is always combined with what is within the scope of human possibility. The same character evinces itself in the infancy of the art in every nation. The priests of India, the physicians of China and Japan, and the jugglers of the savage or half-civilized tribes of the old and new continents, constantly associate with drugs and manual operations certain mysterious practices, upon which they especially rely for the cure of their patients. Such was also, no doubt, the character of the medicine of the Egyptians, in the remote times, previous to the invention of the alphabet, and upon which so very little light is now thrown.

It is curious, however, to find, from some late observations made by the men of science, who accompanied the French expedition to Egypt, in 1798, that among the ruins of ancient Thebes there are documents, which fully prove that surgery, in the early times of the Egyptians, had made a degree of progress, of which few of the moderns have any conception. It is noticed by Larrey, that when the celebrated French General Desaix had driven the Mamelukes beyond the cataracts of the Nile, the Commission of Arts had an opportunity of visiting the monuments of the famous Thebes, and the renowned temples of Tentyra, Karnack, Medynet, Abou, and Luxor, the remains of which still display their ancient magnificence. It is upon the ceilings and walls of these temples that basso-relievos are seen representing limbs that had been cut off with instruments very analogous to those which are employed at the present day for amputations. The same instruments are again observed in the hieroglyphics and vestiges of other surgical operations may be traced, proving that in these remote periods, surgery kept pace with the other arts, which had already attained a high degree of perfection. (*Larrey, Mémoires de Chir. Militaire, T. 1, p. 238; T. 2, p. 223.*)

We next come to the epoch when, by the union and arrangement of scattered facts, the science truly arose. Hippocrates, born in the island of Cos, four hundred and sixty years before the common era, collected the observations of his predecessors, added the results of his own experience, and composed his first treatises. In the hands of this great genius, medicine and surgery did not make equal progress. The former reached the highest degree of glory. Hippocrates drew up the history of acute diseases in so masterly a style, that twenty past centuries have hardly found occasion to add any thing to the performance. But surgery was far from attaining the same degree of perfection. The religious veneration for the asylums of the dead, and the impossibility of dissecting the human body, formed an insurmountable obstacle to the study of anatomy. An imperfect acquaintance with the structure of animals, reputed to bear the greatest resemblance to man, could only furnish venturesome conjectures, or false inferences. These circumscribed notions sufficed for the study of acute diseases. In these cases. the attentive observation of strongly-marked symptoms, and the idea of the operation of a salutary principle, derived from remarking the regular succession of such symptoms, and their frequently beneficial termination, enlightened the physician in the employment of curative means; while surgery, deprived of the assistance of anatomy, was too long kept back in an infant state. Whatever praises may have been bestowed on those parts of the works of Hippocrates particularly relating to surgery, and which amount to six in number (*de officina medici; de fracturis; de capitis vulneribus; de articulis vel luxatis; de ulceribus; de fistulis;*) when compared with his other acknowledged legitimate writings, they appear only as the rough sketches of a picture by a great master.

Excepting the fragments, collected or

cited by Galen, we possess no work written by any of the successors of Hippocrates until the period of Celsus; which leaves a barren interval of almost four centuries. In this space lived Erasistratus, as well as Herophilus, celebrated for the sects which they established, and particularly for having been the first who studied anatomy upon the human body.

Celsus lived at Rome in the reigns of Augustus, Tiberius, and Caligula. He appears never to have practised the healing art, on which, however, he has written with much precision, elegance, and perspicuity. His work is the more precious, inasmuch as it is the only one, which gives us information, with regard to the progress of surgery in the long interval between Hippocrates and himself. The four last books, and especially the seventh and eighth, are exclusively allotted to surgical matter. The style of Celsus is so elegant, that he has generally been regarded quite as the Cicero of medical writers, and long enjoyed high reputation in the schools. His surgery was entirely that of the Greeks, notwithstanding he wrote at Rome: for, in that capital of the world, physic was then professed only by persons who had either come from Greece, or had received instruction in the celebrated schools of this native soil of all the arts and sciences.

Let us pass over the interval which separates Celsus and Galen. This latter was born at Pergamus in Asia Minor, and came to Rome in the reign of the emperor Marcus Aurelius. He practised surgery and physic there about the year 165 of the christian era. (*Galeni Opera Omnia*, 1521. *Edit. Aldi*, 5 *Vols. in fol.*) These two sciences were at that time still united, and though some writers of much earlier date speak of the division of physic into dietetical, chirurgical, and pharmaceutical, no such distinction was followed in practice. As Galen had been a surgeon at Pergamus he continued the same profession at Rome; but, being soon attracted by the predominating taste of the age in which he lived, for a science which more easily yields to the systems and dazzling speculations of philosophical sects, he afterward neglected surgery which strictly rejects them. His writings prove, however, that he did not abandon it entirely. His commentaries on the treatise of Hippocrates, *De Officina Medici*, and his essay on bandages, and the manner of applying them, show that he was well versed even in the minor details of the art. Besides it is known, that he paid great attention to pharmacy, and in his work upon antidotes, chap. 13, he tells us himself, that he had a drug shop in the Via Sacra, which fell a sacrifice to the flames that destroyed, in the reign of Commodus, the Temple of Peace, and several other edifices.

To Galen succeeded the compiler Oribasius, Œtius of Amida, a physician, who lived towards the close of the fifth century, Alexander of Tralles, and Paulus Œgincta, so called from the place of his birth, though he practised at Rome and Alexandria. Paulus collected into one work, still justly esteemed, all the improvements, which had been made in surgery up to his own time. He concludes the series of Greek and Roman physicians, and may be looked upon as the last of the ancients, unless it be wished to let the Arabians have a share in the honours of antiquity. "He appears, says Portal, to be one of those unfortunate writers, to whom posterity has not done justice. It seems as if he had been decried without having been read; for if pains had been taken to examine his works, he would neither have been regarded as a mere copyist, nor been called the "ape of Galen," with whom he does not always coincide. Nay, in some places, he ventures to oppose the doctrines of Hippocrates. He was perfectly acquainted with the practice of the ancients, and when he agrees with, or differs from them, it is not from a spirit of contradiction, but because the reasons, which led him to take one side, or the other, appeared to him well founded." (*Portal, Hist. de l'Anat. &c. T.* 1, *p.* 123.) All now agree, that surgery is much indebted to him. (See *R. A. Vogel, De Pauli Œginetæ, Meritis in Medicinam imprimisque Chirurgiam, 4to Gott.* 1768.) Afterward the downfall of surgery followed that of all the other sciences, and from the capture of the Alexandria by the Saracens under Amrou, viceroy of Egypt, 1641, until the end of the tenth century, nothing prevailed but the dark clouds of ignorance and barbarism. The Arabians, who became masters of a great part of the Roman empire, dug up the Greek manuscripts, which lay buried under the ruins of the libraries; translated them; appropriated to themselves the doctrines which they contained; impoverished them with additions; and transmitted to posterity only enormous compilations. In a word, such are the treatises of Rhazes, Hali-Abbas, Avicenna, Averrhoes, and Albucasis, the most celebrated of the Arabian authors. Inventors of a prodigious number of instruments and machines, they appear to have calculated the efficacy of surgery by the richness of its arsenals, and to have been more anxious to inspire terror, than confidence. As an instance of the cruelty of their methods, I shall merely notice, that, in order to stop the bleeding after amputation of a limb, they plunged the stump in boiling pitch.

The fate of medicine was not more fortunate. In vain the school of Salernum, founded about the middle of the seventh century, made some attempts to revive its splendour. As a modern writer observes, medical science, seated on the same benches where the doctrine of Aristotle, accommodated to religious opinions, was the subject of endless controversies, imbibed, as it were by contagion, the argumentative and sophistical mania, and became enveloped in the dark hypotheses of scholastic absurdity. (*Richerand, Nosogr. Chir. T.* 1, *Ed.* 2.)

The universal ignorance (continues this author;) the pretended horror of blood: the dogma of a religion which shed it in torrents for useless quarrels; an exclusive relish for the subtleties of the school, and speculative theories; are circumstances further explaining the profound darkness which followed these empty labours. About the middle of the twelfth century, (1163,) the Council of Tours prohibited the ecclesiastics, who then shared with the Jews the practice of medicine in christian Europe, from undertaking any bloody operation. It is to this epoch that the true separation of medicine from surgery must be referred. The latter was abandoned to the laity, the generality of whom, in those ages of barbarism, were entirely destitute of education. The priests, however, still retained that portion of the art which abstained from the effusion of blood. Roger Rolandus, Bruno, Gulielmus de Salicetus, Lanfranc, Gordon, and Guy de Chauliac, confined themselves to commentaries on the Arabians, and if the latter author be excepted, they all disgraced surgery by reducing it nearly to the mere business of applying ointments and plasters. Guy de Chauliac, however, the last of the Arabians, is to be honourably excluded from such animadversion. His work written at Avignon, in 1363, in the pontificate of Urban the fifth, to whom he was physician, continued to be, for a long while, the only classical book in the schools. It may be observed, that as he imitated in every respect the other Arabian physicians, and like them thought that it did not become an ecclesiastic to deviate from the austerity of his profession, he passed over in silence the diseases of women.

At length Antonio Beneveni, a physician of Florence, began to insist upon a truth, of the highest importance to the extension of surgical knowledge, viz. that the compilations of the ancients and Arabians ought to be relinquished for the observation of nature. (*De abditis rerum causis, Florent.* 1507, *4to.*) A new era now began. The moderns were convinced, that by treading servilely in the footsteps of their predecessors, they should never even equal, much less surpass them. The labours of Vesalius also gave birth to anatomy, illuminated by which science, surgery put on quite a different appearance in the hands of Ambroise Paré, the first and most eminent of the French surgeons. For the credit of Italy, however, it should be recorded, that the sensible writings published in that country prior to the time of Paré, had the greatest influence in creating a due sense of the value and importance of surgery, and in disposing men of talents and education to cultivate it as a liberal profession.

Obeying the dictates of his genius, Paré made authority yield to observation, or sought to reconcile them. However, his superior merit soon excited the ignorant, the jealous, and the malignant against him; he became the object of a bitter persecution, and his discoveries were represented as a crime. Although he was the restorer, if not the inventor, of the art of tying the blood-vessels, the power of his persecutors compelled him to make imperfect extracts from Galen, and alter his text, in order to rob himself, in favour of the ancients, of the glory which this distinguished improvement deserved.

Surgeon of King Henry the second, Francis the second, Charles the ninth, and Henry the third, of France, Paré practised his profession in various places, followed the French armies into Italy, and acquired such esteem, that his mere presence in a besieged town was enough to reanimate the troops employed for its defence. In the execrable night of Saint Bartholomew, his reputation saved his life. As he was of the reformed religion, he would not have escaped the massacre, had not Charles the ninth himself undertaken to protect him. The historians of those days (*Mem. de Sully*) have preserved the remembrance of this exception, so honourable to him who was the object of it; but which should not diminish the just horror which the memory of the most weak and cruel tyrant must ever inspire. "Il n'en voulut jamais sauver aucun (says Brantome) sinon maistre Ambroise Paré, son premier chirurgien, et le premier de la chrétienneté; et l'envoya querir et venir le soir dans sa chambre et garderobe, lui commandant de n'en bouger; et disait qu'il n'était raisonnable qu'un qui pouvait servir à tout un petit monde, feust ainsi massacré."

Ambroise Paré was not content, like his predecessors, with exercising his art with reputation; he did not follow the example of the Quatre-Maîtres of Pitard, so justly celebrated for having composed the first statutes of the College of Surgeons at Paris, in the reign of St. Lewis, whom he had attended in his excursions to the Holy Land; and of several other surgeons, the fruits of whose experience were lost to their successors. Paré transmitted the result of his own experience in a work that will remain immortal. (See *Œuvres d' Ambroise Paré, Conseiller et premier Chirurgien du Roi, divisées in 28 livres, in folio, Edit. 4to. Paris,* 1535.)

His writings, so remarkable for the variety and number of facts in them, are eminently distinguished from all those of his time, inasmuch as the ancients are not looked up to in them with superstitious blindness. Freed from the yoke of authority, he submitted every thing to the test of observation, and acknowledged experience alone as his guide. The French writers are with reason proud of their countryman Paré to this day: they allege, that he must ever hold among surgeons the same place that Hippocrates occupies among physicians. Nay, they add, that perhaps there are none, either of the ancients or moderns, who are worthy of being compared with him. (*Richerand Nosogr. Chirurg. T.* 1.)

After the death of this great man, surgery, which owed its advancement to him, continued stationary, and even took a retrograde course. This circumstance is altogether ascribable to the contemptible state into which those who professed the art fell, after being united to the barbers by the most disgraceful association.

Pigrai, the successor of Ambroise Paré, was far from being an adequate substitute for him. A spiritless copyer of his master, he abridged his surgery in a latin work, where the unaffected graces of the original, the sincerity, and the ineffable charm inseparable from all productions of genius, entirely disappeared. He received, however, equal praise from his contemporaries; doubtless, because he filled a high situation; but, as Richerand remarks, his name, which is to-day almost forgotten, proves sufficiently, that dignities do not constitute glory.

Rousset and Guillemeau distinguished themselves, however, in the art of midwifery, while Covillard, Cabrol, and Habicot enriched surgery with a great number of curious observations. (See *Obs. Chir. pleines de remarques curieuses, Lyon*, 1639, *in* 8*vo*. *Alphabet Anatomique, Genève*, 1602, *in* 4*to*. *Semaine Anatomique; Question Chir. sur la Bronchotomie, Paris*, 1620, *in* 8*vo*.)

In the next or seventeenth century, a fresh impulse produced additional improvements. Then appeared in Italy, Cæsar Magatus, who simplified the treatment of wounds, (*de rarâ vulnerum medicatione, libri* 2, *Venet*. 1616, *in folio*;) Fabricius ab Aquapendente, even less praise-worthy as a surgeon than as a physiologist, (*Opera Chir. Paris*, 1613 *in fol.*;) and Marcus Aurelius Severinus, that restorer of active surgery. *De efficaci Medicina, libri* 3, *Francofurt*, 1613, *in folio*. *De recondita abscessuum natura libri* 7, *Neapoli*, 1632, *in* 4*to*. *and Trimembris Chirurgia*, *&c. Francofurt*. 1653, *in* 4*to*.) Among the English surgeons flourished Wiseman, who was the Paré of England (See *Several Chirurgical Treatises, Lond*. 1676, *in fol.*;) and William Harvey, whose discovery of the circulation of the blood had such an influence over the advancement of surgery, that he must be classed among the principal improvers of this science. (See *Exercitatio Anatomica de motu cordis et sanguinis in animalibus, Francofurti*, 1653, *in* 4*to*.) In Germany, Fabricius Hildanus, (*Obs. et Curationum, Centuriæ* 6, 2 *Vol. in* 4*to*. 1641.) who was far superior, as a surgeon, to the Italian Fabricius Scultetus, so well known for his work, entitled *Armamentarium Chirurgicum; Ulmæ*, 1653, *in folio*. Purmann and Solingen, who had the fault of being too partial to the use of numerous complicated instruments. (See *Cursæ Obs. Chir. Lipsiæ*, 1710, *in* 4*to*. *Manuale Obs. der Chirurgie, Amsterdam*, 1684, *in* 4*to*.)

Holland, restored to liberty by the generous exertions of its inhabitants, did not remain a stranger to the improvement of surgery. This nation, so singular in many respects, presents us with one particularity which claims the notice of a medical historian. Ruysch, who was an eminent anatomist, and merits equal celebrity for his *Obs. Anatomico-Chirurgicarum Centuriæ, Amstelodam*. 1691, *in* 4*to*. carried with him to the grave the secret of his admirable injections. (See also his *Thesaur. Anat.* x. *in* 4*to*. *Adversariorum anatomicorum medico-chirurgicorum Decad*. 3, *in* 4*to*. *Amstelodam*.) Roonhuysen also made a secret of his lever, which, before the invention of the forceps, was the only resource in difficult labours. Raw, who successfully cut fifteen hundred patients for the stone, took such pains to conceal his manner of operating, that Heister and Albinus, his two most distinguished pupils, have each given a different explanation of it. Such a disposition, which was extremely hurtful to the advancement of surgical knowledge, would materialy have retarded the progress of surgery in Holland, had not Camper, in the following century, effaced this imputation by the great number of his discoveries, and his zealous desire to make them public.

While great improvements were going on in Italy, England, and Holland, surgery languished in a humiliated state in France. The accoucheur Mauriceau (*Traité des Maladies des Femmes grosses, Paris*, 1668, *in* 4*to*.) Dionis, (*Cours d'Opérations de Chirurgie, Paris*, 1707, 8*vo*.) Saviard, (*Nouveau Recueil d'Obs. Chir. Paris*, 1702, *in* 12*mo*.) and Belloste (*Chirurgien d'Hopital, Paris*, 1696, *in* 8*vo*.) were the only French surgeons of note who could be contrasted with so many distinguished men of other nations. Richerand observes, that the splendid days of Louis the Fourteenth were an iron age for discouraged surgery. And yet this monarch seems to have been personally interested in the melioration of this important art; for he was very nearly falling a victim to a surgical disease, a fistula in ano, and was not cured till after a great number of blundering operations and useless experiments.

Chronology teaches simply the history of dates. In the study of the sciences, the only method of impressing the memory with facts, consists in connecting the epoch of them with the learned men by whom they have been illustrated. But the greatest surgeons of the eighteenth century have not altered the face of their profession, although they have powerfully contributed to its advancement. In surgery, as an author has remarked, some feeble rays always precede brilliant lights, and it approaches perfection in a very gradual way. In the last century, however, among the distinguished surgeons of France, there are two of extraordinary genius, round whom, as it were, all the others might be grouped and arranged, and whose names deserve to be affixed to the two most brilliant epochs of French surgery. These are, first, J. L. Petit, whose glory was shared by the Academy of Surgery; and, secondly, the celebrated Desault.

It is not with surgery, as with physic, strictly so called; the epochs of the latter are distinguished by hypotheses; while those of surgery are marked by discoveries. The eminent men in this last branch of the profession have not, like the most renowned physicians, created sects, built systems, destroyed those of their predecessors, and constructed a new edifice, which in its turn has been demolished by other hands. All of them have been satisfied with combating ancient errors, discovering new facts, and continuing their art, the sphere of which they have enlarged by their discoveries, without making it bend under the yoke of systems, which it would have ill supported. To this steady and uniform course, (says Richerand,) which is a striking proof of the superiority of surgery, and of the certainty and invariableness of its principles, shall we oppose the numerous revolutions of physic? The Christian religion, which abounds in sects, has not a greater number of them than physic. "Naturistes, solidistes, humoristes, vitalistes, animistes, semi-animistes, mécaniciens, chimistes; le plus grand nombre des médecins honore Hippocrate d'un culte presque superstitieux; ceux-ci marchent sous les bannieres de Staahl; ceux-la s'appuient du grand nom de Boerhaave; tels autres invoquent Sydenham, Hoffmann, Stoll; absolument comme les theologiens combattent pour Luther, Zuingle, Calvin, ou Jansen." (*Nosogr Chir. T.* 1.)

The elogy on J. L. Petit, delivered in the midst of the Royal Academy of Surgery, of which he was one of the first and most distinguished members, represents him as blending the study of anatomy with his amusements when a boy; and ardently seeking every opportunity to increase his knowledge by observation. He had had experience enough to publish at an early period of his life his *Traité sur les Maladies des Os, Paris,* 1705, *in 12mo.;* a work which for a century was esteemed the best upon the subject. His success was most virulently opposed by the envious critics; and it was not till after more than thirty years of academical labours and extensive practice, that he was unanimously chosen the head of his associates. This acknowledged superiority, however, was the more flattering, as the honour was obtained at a period when surgery was in a flourishing state in France, and when Petit held no office, from which he could derive an influence foreign to his personal merit. While Mareschal, La Peyronie, and La Martiniere assured him of the royal favour, Quesnay, Morand, and Louis, who corrected his writings, made him speak a language which does honour to that famous collection, to which he contributed his observations, (see *Mémoires et Prix de l'Academie Royale de Chirurgie,* 10 *Vols. in 4to.*) and in which, if some theoretical explanations be put out of consideration, nothing has lost its value by age. J. L. Petit was also the author of a "*Traité des Maladies Chirurgicales et des Opérations qui leur conviennent. Ouvrage Posthume;*" a production that will always stand high in the estimation of the judicious surgeon.

The history of this epoch, so glorious for the profession of surgery, is completely detailed in the Memoires and Prix of the Royal Academy of Surgery; a work which is absolutely indispensable, and the various parts of which cannot be too often considered. In it are preserved the labours of Mareschal, Quesnay, La Peyronie, Morand, Petit, De la Martiniere, Le Dran, Garengeot, De la Faye, Louis, Verdier, Foubert, Hevin, Pibrac, Fabre, Le Cat, Bordenave, Sabatier, Puzos, Levret, and several other practitioners, who, though less famous, contributed by their exertions and knowledge to form this useful body of surgical facts. Many of the preceding surgeons also distinguished themselves by other productions, which, however, I shall not here enumerate, as they are quoted in many other parts of this work.

To the foregoing list of eminent French surgeons, must be added the names of La Motte, Mâitre-Jean, Goulard, Daviel, Ravaton, Mejean, Pouteau, David, and Frère Cosme.

While surgery was thus advancing in France, other nations were not neglectful of it. At this period flourished in England, White, Cheselden, Douglas, the two Monros, Sharp, Cowper, Warner, Alanson, Percival Pott, Hawkins, Smellie, and the two Hunters.

White's *Cases in Surgery,* 1770; Cheselden's *Treatise on the High Operation for the Stone, London,* 1723 *in* 8vo. and his *Treatise on the Anatomy of the Human Body;* Douglas's Tract, entitled "*Lithotomia Douglassiana;*" Sharp's *Treatise of the Operations;* and his "*Critical Inquiry into the present State of Surgery;*" *Monro's Works by his son; Warner's Cases in Surgery,* 1754, *and his Description of the Eye and its Diseases,* 1775; *Alanson's Treatise on Amputation; Pott's Chirurgical Works; Smellie's Midwifery;* and *John Hunter on the Blood, Inflammation, &c.; his Treatise on the Venereal Disease; Animal Economy, the Teeth,* and all the papers written by himself and his brother, in the *Phil. Trans. Med. Obs. and Inquiries, and Trans. of a Society for the Improvement of Med. and Chir. Knowledge;* are productions which reflect the highest credit on the state of surgery in England.

But of all these eminent men, none contributed more powerfully than Mr. Percival Pott, to the improvement of the practice of surgery in England. His life, indeed, forms a sort of epoch in the history of the profession. Before his inculcations and example had produced a desirable change, the maxim of "*dolor medicina doloris,*" as we learn from Sir James Earle, remained unrefuted. The severe treatment of the old school, in the operative part and in the applications, continued in force. The first principles of surgery, the natural process and powers of healing, were either not understood, or not attended to; painful and escharotic dressings were continually employed; and the actual cautery was in such frequent use, that at the times when the surgeons visited the hospital, it was regularly heated, and prepared as a necessary part of the apparatus. Where shall we find more sensible, or more truly practical observations on the treatment of abscesses, than in his excellent treatise on the fistula in ano? Where shall we meet with better remarks on the local treatment of gangrenous parts, than in his valuable tract on the mortification of the toes and feet? What author abounds with so many just observations on the injuries of the head, blended, it is true, with rather too great a partiality to the trepan, the so frequent necessity for which is now less generally acknowledged? His description of the inflammation and suppuration of the dura mater, and of the treatment, is matchless. The account which he has left us of the disease of the vertebræ, attended with paralysis of the limbs, is perhaps his most original production. His celebrated essay on fractures, was also very original, and has had in this country considerable influence over the treatment of these injuries; but there can now be no doubt, that the effects of position were exaggerated in this part of his writings, and that surgeons ought still to make every possible exertion to render their apparatus for broken bones more effectual. (See *Fractures.*) A more really valuable production of this eminent surgeon is his remarks on amputation. The necessity for that operation in certain cases is there convincingly detailed; and the most advantageous period for its performance clearly indicated. The urgency for its prompt execution, after particular injuries, he has indeed so perfectly explained, that the late inculcations on the subject by Larrey, and several other modern surgeons, appear to be in a great measure anticipated; the only difference being, that Pott's remarks applied principally to compound fractures, while Larrey's refer to gunshot wounds. All these, however, are cases of accidental violence, and of course should be treated upon the same general principles.

A longer comment on the writings and improvements of Percival Pott would here be requisite to do him every degree of justice; but his name, advice, and opinions are so conspicuous throughout this volume, that I shall be excused for not saying any thing more in the present place, than that he was in his time, the best practical surgeon, the best lecturer, the best writer on surgery, the best operator, of which this large metropolis could boast.

Another character of still greater genius and originality, though of inferior education, was the ever memorable John Hunter, surgeon to St. George's Hospital, who was at once eminent as a surgeon, an anatomist, a physiologist, a naturalist, and philosopher. If Pott materially improved many parts of the practice of surgery in England, and evinced himself to be the most skilful operator of his time, John Hunter was also not less importantly employed in extending the boundaries of physiological knowledge, and in the investigation of human, and particularly comparative anatomy. The knowledge which he derived from his favourite studies, he constantly applied to the improvement of the art of surgery, and he omitted no opportunity of examining morbid bodies, whereby he collected facts which are invaluable, as they tend to explain the real causes of the symptoms of numerous diseases.

In the practice of surgery, whenever operations proved inadequate to their intention, Mr. Hunter always investigated with uncommon zeal the causes of ill success, and in this way he detected many fallacies, as well as made some important discoveries in the healing art. He ascertained the cause of failure, common to all the operations in use for the radical cure of the hydrocele, and was enabled to propose a mode of operating attended with invariable success. He ascertained, by experiments and observations, that exposure to atmospherical air, simply, can neither produce nor increase inflammation. He discovered in the blood so many phenomena connected with life, and not to be referred to any other cause, that he considered it alive in its fluid state. He improved the operation for the fistula lachrymalis, by removing a circular piece of the os unguis, instead of breaking it down with the point of a trocar. He explained better than any of his predecessors, all the highly interesting modern doctrines relative to inflammation, union by the first intention, suppuration, ulceration, and mortification. His writings also throw considerable light on the growth, structure, and diseases of the teeth. As instances of his operative skill, it deserves to be mentioned, that he removed a tumour from the side of the head and neck of a patient at St. George's Hospital, as large as the head to which it was attached; and by bringing the cut edges of the skin together, the whole wound was nearly healed by the first intention. He likewise dissected out of the neck a tumour, which one of the best operators in this country had declared, rather too strongly, that no one but a fool or a madman would meddle with; and the patient got perfectly well. But perhaps the greatest improvement which he made in the practice of surgery, was his invention of a new mode of performing the operation for the popliteal aneurism, by taking up the femoral artery on the anterior part of the thigh, without opening the tumour in the ham. (See *Trans. of a Society for the Improvement of Med. and Chir. Knowledge.*) The safety and efficacy of this method of operating have now been fully established, and the plan has been extended to all operations for the cure of this formidable disease. (See *Aneurism.*)

According to Sir Everard Home, Mr. Hunter was also one of the first who taught, that cutting out the bitten part was the only sure mode of preventing hydrophobia; and he lengthened the time in which this proceeding might be reasonably adopted, beyond the period which had been generally specified.

His researches into the nature of the venereal disease, and his observations on the treatment, will for ever be a lasting monument of his wonderful powers of reasoning and investigation. If he left some points of the subject doubtful and unsettled, he has admirably succeeded in the elucidation of others; and his work on this interesting disorder, is, with all its defects, the best which is yet extant.

Even the language and mode of expression of this great man were his own; for so original were his sentiments, that they could hardly be delineated by any ordinary arrangement of words. His phrases are still adopted in all the medical schools of this country, and continue to modify the style of almost every professional book. Great as Mr. Hunter's merit as a surgeon was, it was still greater as a comparative anatomist and physiologist. The museum of the Royal College of Surgeons, and his papers in the Phil. Trans. will for ever attest his greatness in these characters.

At the period, when the preceding distinguished men upheld the character of their profession in Great Britain, Lancisi, Morgagni, Molinelli, Bertrandi, Guattani, Mascagni, Matani, Troja, and Moscati, were doing the same thing in Italy. Bertrandi's Treatise on the Operations of Surgery, and Troja's Work on the Regeneration of Bones, are even at this day works of the highest repute. Of late years, the credit of the Italian surgeons has been honourably maintained by Monteggia, Scarpa, Paletta, Quadri, Assalini, Morigi, and others. In Holland flourished Albinus, Deventer, Sandifort, and Camper; and in Germany, and the north of Europe, the immortal Haller, Heister, well known for his "*Institutiones Chirurgiæ*;" Platner; Rœderer (*Elementa Artis Obstetriciæ. Goett.* 1752: *Obs. de Partu Laborioso. Decad.* II, 1756.) Stein, Bilguer, Acrell, Callisen, (*Systema Chirurgiæ Hodiernæ, 2 Vol. 8vo.*) Brambilla, Theden, (*Progrès ulterieurs de la Chirurgie.*) Schmucker, (*Vermischte Chirurgische Schriften, B.* 3, *and Chir. Wahrnehmungen.*) Richter, (*Traite des Hernies, 2 Vol. 8vo. Bibl. fur die Chirurgie; Ansfangsgr. der Wundarzn.* 7 *B. and Obs. Chirurgicarum Fasc.*) Also Arnemann, Weidmann, Beer, Soemmering, Creutzenfeldt, Hesselbach, Hufeland, Graefe, Klein, Himly, Langenbeck, Walther, J. A. Schmidt, G. J. Beer, &c. should not be forgotten, several of whom are still pursuing their useful and honourable career. Be it also recorded as a part of the great merit of the Germans, that they now rank among the best and most minute anatomists; that they are zealous cultivators of comparative anatomy; that their industry allows no improvement in medical science, wherever made, to escape their notice; and that surgery is greatly indebted to them for the best descriptions of the diseases of the eye.

On the continent, the Academy of Surgery at Paris was long considered quite as the solar light of this branch of science. The French Revolution, which, by a fatal abuse, involved in the same prohibition both useful and pernicious societies, did not spare even this beneficial establishment. Although the Academy was deprived of the talents of Louis, who died a short time before its suppression, it yet had at this period several members, worthy of continuing its labours, and supporting its reputation: Sabatier, Desault, who may be regarded as the Pott of France, Chopart, Lassus, Peyrilhe, Dubois, Percy, Baudeloque, Pelletan, Sue, &c.

The Academy of Surgery in France was succeeded by what is named the Ecole de Médécine. Desault, who was almost a stranger in the former, became quite the leading character in the latter. Several things recommended him strongly to the remembrance and admiration of posterity; the exactness and method which he introduced into the study of anatomy; the ingenious kinds of apparatus which he invented for the treatment of fractures; a noble ardour in his profession, which he knew how to impart to all his pupils; his clinical lectures upon surgery, which were the first ever delivered; and the boldness and simplicity of his modes of operating. Indeed, such was his genius, that even when he practised only methods already understood, he did them with so much adroitness, that he rather appeared to be the inventor of them. From the Ecole de Médécine have issued Dupuytren, Boyer, Richerand, Dubois, Lheritier, Manoury, Lallemant, Petid de Lyon, Bichat, &c.

The researches of Bichat, who quitted surgery, powerfully contributed to the advancement of physiological science. His mind, richly stored with the positive facts which he had learned in the study of surgery, conceived no less a project than that of rebuilding the whole edifice of medicine. Some courses of lectures upon the materia medica, internal clinical medicine and morbid anatomy, announced this vast design, which was frustrated by a premature death.

Bichat, as a physiologist, and man of very original genius, may be consideral as the John Hunter of France; but his qualities were of a different cast, and hardly admit of comparison with those of Hunter, whose investigations were not limited to man, but extended to the whole chain of animated beings. Bichat died in the midst of his labours, and in dying his greatest regret was that of not having completed them. His example, says Richerand, proves most convincingly what Boerhaave always inculcated, how indispensable the study and even the practice of surgery are to him, who would wish to be a distinguished and successful physician. (*Nosogr. Chir. Tom.* 1, *p.* 25.)

Perhaps nothing contributed so materially to the improvement of surgical knowledge, as the establishment of the Royal Academy of Surgery in France; a noble institution, which, for a long while, gave our neighbours infinite advantage over us, in the cultivation of this most useful profession. Indeed, every one truly interested in the improvement of surgery, cannot fail to regret the discontinuance of a society, in which emulation and talents were so long united for the benefit of mankind. The various dissertations published by the illustrious members of the academy, will serve as a perpetual memorial of the spirit, ability, and success, with which the objects of the institution were pursued; and centuries hence, practitioners will reap from the pages of its memoirs the most valuable kind of surgical information. Unfortunately, this establishment, which was overthrown by the agitation of the French Revolution, has had only a very inferior substitute in the Ecole de Médécine.

Were I to name any one thing, which, in my opinion, would have the greatest influence in giving life to the study and cultivation of surgery in this country, I should without hesitation assign such importance to the establishment of an institution in the metropolis, on the same grand, liberal, and encouraged plan, as the late Royal Academy of Surgery in France.

At the same time, I am conscious that the present Medical and Chirurgical Society of London have every claim to the encouragement and gratitute of the profession. No other institution of the kind has ever done so much in so short a space of time. Many of the facts which they have collected and published, are of considerable importance, especially those relating to the subjects of aneurism and hemorrhage. Their library is already the most select, valuable, and complete collection of medical literature in Great Britain; and it is daily receiving additions both by large purchases at home and abroad, and by the liberal donations of its members. The intercourse and correspondence which such a society continually maintain among the innumerable scattered members of the profession, cannot fail to be attended with the most beneficial consequences. A generous and useful sort of emulation is thus kept alive; the spirit of inquiry is prevented from slumbering; and every individual who ascertains a new fact, has now the means of making it known to the world, with all the expedition which its importance may demand.

Within the last twenty or thirty years, most important improvements have certainly been made in almost every branch of surgery; and it must gratify every Englishman to find, that his own countrymen have acted a very leading part in effecting an object, in which the interests of mankind are so deeply concerned.

Before the time of Mr. John Hunter, our ideas of the venereal disease were surrounded with absurdities; and it is to this luminary that we, are in an eminent degree indebted for the increased discrimination and reason, which now prevail, both in the doctrines and treatment of the complaint. It must be confessed, however, that much yet remains to be made out, respecting the nature and treatment of syphilitic disorders. Need I mention a greater proof of the truth of this remark, than the sudden change of practice in some of the principal hospitals in London, mercury being now not exhibited in more than one out of ten cases, for which this medicine a few years ago was always deemed indispensable? Numerous cases, having all the characters of primary venereal sores, seem now to be curable by simple dressings and cleanliness. In short, so different is every thing from what it used to be, that many surgeons are tempted to suppose the nature of the venereal disease totally altered. Some observations on this important topic are offered in another place. See *Venereal Disease.*

Strictures in the urethra, an equally common and distressing disease, were not well treated of before Mr. Hunter published on the venereal disease; and the advantage of armed bougies in the treatment of certain cases has been subsequently pointed out by Sir Everard Home.

In modern times, hernial diseases, those common afflictions in every country, have received highly interesting elucidations from the labours of Pott, Camper, Richter, Sir Astley Cooper, Hey, Gimbernat, Hesselbach, Scarpa, Lawrence, &c.

The treatment of injuries of the head has been materially improved by Quesnay, Le Dran, Pott, Hill, Desault, and Abernethy.

The disease of the vertebræ, which occasions paralysis of the limbs, formerly always baffled the practitioner; but the method proposed by Mr. Pott is now frequently productive of considerable relief, and sometimes of a perfect cure. The diseases of the joints in general may also be said to be at present viewed with much more discrimination than they were a very few years ago; and this great step to better and more successful practice reflects great honour on Mr. Brodie, while it keeps up a well-founded hope, that morbid anatomy, the study which has of late banished so much confusion from this part of surgery, will yet be the means of bringing to light other useful facts and observations, relative to the diseases of the joints in general.

The mode of treating lumbar abscesses has been rendered much more successful than formerly, and for this change the world is indebted to Mr. Abernethy.

The almost infallible plan of curing hydroceles by an injection, as described by Sir James Earle, may also be enumerated among modern improvements.

The increasing aversion to the employment of the gorget in lithotomy, and the many distinguished advocates for the use of better instruments in this operation, may be hailed as propitious omens of beneficial changes in this part of practice.

The diseases of the eyes, to which affections English surgeons seemed to pay much less attention than was bestowed by foreign practitioners, now obtain due attention in this country. Although we have generally had some distinguished oculists, our regular surgeons have generally been wonderfully ignorant of this part of their profession, and uninformed on the subject, they have given up to professed oculists and quacks one of the most lucrative and agreeable branches of practice. However, the able writings of Daviel, Wenzel, and Ware, begin now to be familiarly known to practitioners: and the observations of Scarpa, Richter, Beer, Wardrop, Travers, and Saunders, will soon have immense effect in diffusing in the profession a due knowledge of the numerous diseases, to which the organs of vision are liable. As likewise the generality of the hospital surgeons of London, have, during the last thirty years, grossly neglected the study of the diseases of the eye, and conscientiously refused to have any thing to do with these cases, the public at length saw the necessity of establishing Eye Infirmaries, where such afflictions might be more attentively observed and relieved. Some of these have now become excellent schools, in which the rising generation of surgeons have abundant opportunities of studying the nature of all the diseases of the eyes, and the most approved methods of treatment.

While, however, I am thus commending separate institutions for disorders of the eye, it becomes me to express my regret for the long-continued neglect, and the ignorance of these diseases, manifested by several hospital surgeons, which were in fact the original causes of those distinct establishments. For, according to my conceptions, it would have been far better to have had the practice in eye-cases exhibited in the common great schools of surgery, the large hospitals of London. I am of this opinion, not only because I think these diseases would then have met with more general and public observation; but also because I have always considered all unnecessary subdivisions of practice, in short all measures which tend to throw particular cases into the hands of a few individuals, hurtful to the best interests, and degrading to the character of the profession.

In the treatment of aneurismal diseases, English surgeons have much to be proud of. All the boldest operations in this branch of surgery have been devised by the genius, and executed by the spirit and skill of British surgeons. Even M. Roux himself is here obliged to confess our superiority. (*Parallèle de la Chirurgie Angloise, &c. p.* 249.) The carotid artery, the external and internal iliac, and the subclavian, have all been successfully tied by surgeons of this country. The first operation, in which the external iliac was tied, I was a spectator of: it was performed by Mr. Abernethy in Bartholomew's hospital, and it has subsequently been repeated in many examples, both in this country and others, with considerable success. I had also the honour of seeing the same gentleman likewise tie the carotid, in the first instance of that operation in England. This important measure has also now been frequently practised with success, and it constitutes one of the great improvements in the operative part of modern surgery.

In the article Aneurism, I have cited many examples, in which the carotid artery has been successfully tied; and the safety and propriety of the operation are now generally known and acknowledged. Indeed, so little are surgeons now afraid of the ill effects upon the brain, that the carotid artery has lately been tied merely for the purpose of enabling the operator to take away a large tumour, including the whole of the parotid gland, from the side of the neck, without risk of hemorrhage; a mode of proceeding, however, which ought not to be encouraged into a common practice. (See *Medico-Chir. Trans. Vol.* 7, *p.* 112.) Before I quit this subject, my feelings call upon me to express the high opinion which I entertain of Mr. Hodgson's Treatise on the Diseases of Arteries and Veins, published in 1815, a work which reflects great credit on English surgery, and contains practical precepts far superior to those of Scarpa.

In the modern practice of surgery, a variety of old prejudices are gradually vanishing. Peruvian bark not many years ago, was regarded as a sovereign remedy and specific for nearly all cases of gangrene; and in these and many other instances, it was prescribed without any discrimination, and in doses beyond all moderation. But the false idea, that this medicine has any specific effect in checking mortification, no longer blinds the senses of the most superficial practitioner. He neither believes this doctrine, nor the still more absurd opinion, that strength can be mysteriously extracted from this vegetable substance, and communicated to the human constitution, in proportion to the quantity which can be made to remain in the stomach. This subject, however, has been duly discussed in the articles *Cinchona* and *Mortification*.

The removal of this deeply-rooted prejudice, concerning the virtues of bark, in stopping mortification, will pave the way to better and more successful practice.

But upon the subject of mortification, the present day opens to us the investigation of a point, which is of the first-rate consequence. Every surgeon is aware, that when a limb is affected with mortification, amputation is absolutely necessary to effect a cure. This is generally acknowledged; but the performance of the operation has, since the time of Mr. Pott, only been sanctioned when the mortification has manifestly ceased to spread, and a line of separation is formed between the dead and living parts. All other instances, in which the disorder was in a spreading state, were left to their fate. It is true, some of the old surgeons occasionally ventured to deviate from this precept; but as they did so without any discrimination, or knowledge of the particular examples which ought to form an exception to the general rule, their ill success cannot constitute a just argument against the plan of amputating earlier in a certain description of cases.

Now if modern experience can prove, that many lives may be saved by a timely performance of amputation, under circumstances in which it has until lately been generally condemned, it must be allowed that the established innovation will be one of the greatest improvements in the practice of the present time.

For reviving the consideration of this question, and venturing to deviate from the beaten path, the world is much indebted to that eminent military surgeon, Baron Larrey. How different his doctrines and practice are from those usually taught in the schools, the article *Mortification* will sufficiently prove.

In the treatment of ununited fractures, the simple and ingenious practice proposed by Dr. Physick of Philadelphia, merits particular notice, not only on account of the several successful trials which have been made of it in this country and France; (See *Medico-Chir. Trans. Vols.* 5 & 7, and *Boyer's Traité des Maladies Chir.*) but also because it is perhaps the first improvement of consequence, that has hitherto been made in the practice of surgery by our transatlantic brethren.

The inestimable treatise of Dr. Jones on Hemorrhage, has now produced quite a revolution in all the principles, by which the surgeon is guided in the employment of the ligature for the stoppage of bleeding and the cure of aneurisms. Instead of thick clumsy cords, small firm silks or threads, are now generally used; and so far is the practitioner from being fearful of tying arteries too tightly, lest the ligature cut through them, that it is now a particular object with him to apply the silk or thread, with a certain degree of force, in order that the inner coat of the vessel may be divided. If this be not done, the effusion of coagulating lymph within the artery, an important part of the process of obliteration, cannot be expected as a matter of certainty, and secondary hemorrhage is more likely to occur. But in order to convey an adequate idea of the beneficial changes which Dr. Jones's observations are tending to produce in practice, we have been careful in the article *Hemorrhage*, to give a tolerably full account of the results of all his interesting experiments.

Besides using very small, firm, round threads, instead of large flat tapes or cords, as was the custom a few years ago, modern surgeons begin to suspect, that much benefit may also arise from cutting off both portions of the ligature close to the knot, after amputation, the removal of the breast, &c. No one has insisted so much as Mr. Lawrence upon the propriety of examining further the merits of this innovation. If no bad effects result from leaving so small a particle of extraneous substance in the flesh, as the little bit of silk composing the knot and noose on the artery, the practice will form a considerable improvement. The wound may then be brought together at every point; the quantity of extraneous matter in the wound will be lessened to almost nothing; the danger of convulsive affections will be reduced in proportion as a serious cause of pain or irritation is diminished; and the chance of accomplishing perfect union by the first intention will be materially increased. Mr. Lawrence has tried the plan in many instances, and hitherto his experience has not found any ill consequences follow, while it has proved, that many advantages are undoubtedly the result of it. In amputations, the method has been practised by several of our military surgeons; and although they have probably not employed exactly such ligatures as this mode absolutely requires, the greater part of them have met with hardly any instances of future trouble from the bits of ligature enclosed in the wound. However, if large ligatures be used, the practice is not fairly tried, or rather the practice is not tried at all; because the great principle, on which it answers, is the very small atom of silk composing the extraneous substance left in the wound, when such ligatures as Mr. Lawrence particularly recommends are employed. Delpech and Roux have also sometimes adopted the plan of removing the ends of the ligature close to the knot. (See *Parallèle de la Chir. Angloise avec la Chir. Fançoise*, p. 131.) See *Amputation*, *Aneurism*, *Hemorrhage*, and *Ligature*.

Among other real improvements in modern practice, I must not forget the present more rational method of dressing the wound, after the majority of capital operations, with light, cooling applications, instead of laying on the part a farrago of irritating pledgets and plasters, and a cumbersome mass of lint, tow, flannel, and other bandages, woollen caps, &c. The fewer the adhesive strips are the better, if they hold the lips of the wound together. This is all they are intended to do. Whereas, if you apply more than are necessary for this purpose, they do harm by heating the part, and covering the wound so entirely as to prevent the issue of the discharge. Over the adhesive plasters, let the surgeon be content with placing a simple pledget of spermaceti cerate, and some linen wet with cold water, which will often avert hurtful degrees of pain and inflammation, by keeping the parts cool.

Wars, which are unfavourable to most other sciences, are rather conducive to advances in surgery. The many new and interesting observations which Baron Larrey has made in the course of his long and extensive military experience, are a proof of the foregoing remark. Pitard, almost the founder of surgery in France, was a military surgeon. Ambrose Paré and Wiseman also collected their most valuable knowledge principally in the service of the army. Mr. Hunter himself gained much of his practical information in the same line of life. To Baron Larrey surgeons are indebted for many highly important observations, relating to amputation in cases of gunshot wounds. In particular he has adduced a larger and more convincing body of evidence, than was ever before collected to prove, that in gunshot injuries, the operation of amputation should always be performed without the least delay, in every instance in which such operation is judged to be unavoidable, and the ultimate preservation of the limb either impossible, or beyond the scope of all rational probability. He has established the truth of this most important precept in military surgery by innumerable facts, drawn chiefly from his own ample experience, and partly from the practice of many able colleagues. The great operations of the shoulder-joint, and hip-joint amputations, he has executed with success. The necessity for the former, however, he proves may sometimes be superseded, and the limb be saved, by making a suitable incision for the extraction of the splintered portions of the upper part of the humerus. This method, which was in many instances done with success in the peninsular war was, I believe, originally proposed and practised by Boucher. (See *Mem. de l'Acad. de Chir. T.* 2, 4*to.*) However, it was more particularly described and even practised by Mr. C. White, of Manchester. (See his *Cases in Surgery.*) It has been repeated with success by Mr. Morell in the York Hospital. (See *Med. Chir. Trans. Vol.* 7.) See *Amputation.*

Amputation at the hip-joint, performed only in the most dreadful cases, because itself the most dreadful operation in surgery, Baron Larrey has performed five times, and twice (I believe) with success. This proceeding has also been adopted by Mr. Brownrigg and Mr. Guthrie, and their patients recovered. As must be the case, however, on account of the desperate circumstances under which the operation is performed, and the severity of the operation itself, the examples of recovery bear only a small proportion to the large number of deaths, known to have followed amputation at the hip in the many cases, in which it has now been undertaken. However the unfortunate truth should not be exaggerated into a reason for a general condemnation of the practice, which is adopted as the only means affording a chance of life. But as there may be difficulty in deciding whether the patient will have the best chance with or without the operation, it is to be hoped that no surgeons will perform it, except under the authority of the united opinion of a board, or consultation of the best-informed practitioners, whom circumstances will allow to assemble. See *Amputation.*

In military surgery, the useful innovation of *ambulances,* or light caravans, furnished with a proper number of surgeons, assistants, and orderlies, and capable of keeping up with the vanguard, if requisite, is undoubtedly the best means of affording speedy surgical assistance to the wounded on the field of battle, and ought to be enumerated as one of the greatest modern improvements. Barons Percy and Larrey deserve the chief praise for their successful exertions in organizing and bringing to perfection so indispensable an establishment. The account of this subject well deserves perusal; and it may be seen either in *Larrey's Mémoires de Chirurgie Militaire,* or in the *Dict. des Sciences Medicales, T.* 5.

SUSPENSORY. A bandage for supporting the scrotum; a bag-truss. Bandages of this kind are now usually sold at the shops, and seldom made by surgeons themselves; therefore a particular description of them is not essential in this work. In cases of hernia humoralis, varicocele, cirsocele, some particular ruptures, and several other affections of the testicle, and spermatic chord, a suspensory bandage is of infinite service.

SUTURES. (from *suo,* to sew.) A suture, in surgery, means a mode of uniting the edges of a wound, by keeping them in contact with stitches.

Mr. Sharp remarks, that "when a wound is recent, and the parts of it are divided by a sharp instrument, without any further violence, and in such manner, that they may be made to approach each other, by being returned with the hands, they will, if held in close contact for some time, reunite by inosculation and cement, like one branch of a tree ingrafted on another. To maintain them in this situation, several sorts of sutures have been invented, and formerly practised, but the number of them has, of late, been very much reduced. Those now chiefly described are the *interrupted,* the *glover's,* the *quilled,* the *twisted* and the *dry,* sutures: but the interrupted and twisted are almost the only useful ones, for the quilled suture is never preferable to the interrupted; the dry suture is ridiculous in terms, since it is only a piece of plaster, applied in many different ways, to reunite the lips of the wound; and the glover's, or uninterrupted stitch, which is recommended in superficial wounds, to prevent the deformity of a scar, does rather, by the frequency of the stitches, occasion it, and is therefore to be rejected, in favour of a compress and sticking plaster." (*Oper. of Surgery.*) The twisted suture is described in speaking of the *harelip;* and *gastroraphe,* which also properly belongs to the present subject, forms a distinct article in this Dictionary.

Interrupted Suture.—The wound being cleansed from all clots of blood, and its lips being brought evenly into contact, the needle, armed with a ligature, is to be carefully carried from without inwards to the bottom, and so on from within outwards. Care must be taken to make the puncture far enough from the edge of the wound, lest the ligature should tear quite through the skin and flesh. This distance, according to Mr. Sharp, may be three, or four-tenths of an inch. The other stitches required are only repetitions of the same process. The threads having been all passed, "you are in general to begin tying them in the middle of the wound; though, if the lips be held carefully together, (says Mr. Sharp,) it will not be of great consequence, which stitch is tied first." (*Operations, Chap.* 1.)

Surgical writers in general state, that the number of stitches must, in a great measure, depend upon the extent of the wound. The common rule is, that one suture is sufficient for every inch of the wound; but that in some instances, a stitch must be more frequently made, particularly when a wound gapes very much, in consequence of a transverse division of muscles. As we have already explained, it is necessary to pierce the skin, at a sufficient distance from the sides of the wound, lest the thread should cut through the flesh in a short time: but, though Mr. Sharp lays down the necessary distance, in general as three, or four-tenths of an inch, and others advise the needle to be always carried through the deepest part of the wound, we must receive these directions, particularly the last, as subject to numerous exceptions. When a wound is very deep, it would be conspicuously absurd, and even, in many instances, dangerous, to drive the needle through a vast thickness of parts. Other wounds, of considerable length, might not be, in some places, four-tenths of an inch deep; though it is true, sutures could never be requisite at such points.

The needles for making the interrupted suture will pass with the greatest facility, when their shape corresponds exactly with the segment of a circle, and they should always form a track of sufficient size to allow the ligatures, which they draw after them, to pass through the flesh with the utmost ease.

The interrupted suture obviously receives its name from the interspaces between the stitches; and it is the one most frequently employed. Its action is always to be assisted and supported, either with the uniting bandage, (see *Bandage*) or with strips of adhesive plaster, compresses, &c.

Quilled Suture.—As Mr. John Bell has observed, "when the wound was deep among the muscular flesh, the old surgeons imagined, that so large a wound could not be commanded by the common interrupted suture, however deep the stitches might be driven among the flesh; they were besides fearful of using the continued (glover's) suture in deep gashes, lest the wound should be made to adhere superficially, while it was still open within, forming perhaps a suppuration, or deep collection of matter. They believed, that a deep muscular wound could not be safely healed, without a degree of suppuration; while they wished to bring it together at the bottom, they were afraid to close it very exactly at the mouth, lest the matter should be collected in the deeper parts of the wound; it was for this purpose (says Mr. John Bell) that they used what they called the *compound*, or *quilled suture.* It is merely the interrupted suture, with this difference, that the ligatures are not tied over the face of the wound, but over two quills, or rolls of plaster, or bougies, which are laid along the sides of the wound. In performing this suture, we make first two, three, or four stitches, of the interrupted suture very deep, and then, all the ligatures being put in, we lay two bougies along the sides of the wound, then slip one bougie into the loop of the ligatures on one side, drawing all the ligatures from the other side, (Mr. Bell should rather have said towards the other side,) till that bougie is firmly braced down. Next we lay the other bougie, and make the knots of each ligature over it, and draw it also pretty firm; and thus the ligatures, in form of an arch, go deep into the bottom of the wound, and hold it close, while the bougies, or quills, keep the middle of the wound, and lips of it pressed together with moderate closeness, and prevent any strain upon the threads, or any coarse and painful tying across the face of the wound." In a note Mr. J. Bell says, that Dionis violently reprobates the quilled suture; but, that De la Faye (the annotator on Dionis) says, it is good for deep muscular wounds. The quilled suture is now scarcely ever employed; nor has it any advantages, except, perhaps, in some wounds in the belly. (See *Principles of Surgery, Vol.* 1, *p.* 50.)

I think the reader will more easily comprehend the manner of making the quilled suture, from the following simple directions. Take as many needles, as stitches (intended to be made; arm them with a double ligature, or one capable of being readily split into two; introduce the ligatures through the wound; cut off the needles: lay a piece of bougie along one side of the wound, and tie the ends of the ligatures over it. Next draw the other extremities of the ligatures, so as to bring the first piece of bougie into close contact with the flesh; lay the second piece of bougie along the opposite side of the wound, and tie the other ends of the ligatures over it with sufficient tightness.

Glover's Suture. This had also the name of the continued suture. It was executed by introducing the needle first into one lip of the wound, from within outwards, then into the other in the same way; and, in this manner the whole track of the wound was sewed up.

The glover's suture has long been rejected by all good surgeons, as improper to be employed in cases of common wounds. It was not, however, till very lately, that this suture was totally abandoned; for Mr. Sharp, and several eminent writers since his time, have advised its adoption in wounds of the stomach and intestines. From what has been said in the articles *Wounds of the Abdomen* and *Hernia*, the reader will perceive, that even in such particular instances, the glover's suture would not be adviseable; so that it may, in every point of view, be now considered as totally disused in every case of surgery which can possibly present itself. When we remember, in making this suture, how many stitches are unavoidable; how unevenly, and in what a puckered state the suture drags the edges of the skin together, and what irritation it must produce, we can no longer be surprised at its now being never practised on the living subject. It is commonly employed for sewing up dead bodies; a purpose for which it is well fitted, but for the honour of surgery, and the sake of mankind, it is to be hoped that it will never again be adopted in practice.

False, or Dry Suture.—Modern surgeons commonly understand by this expression nothing more, than the plan of bringing the sides of a wound together, by means of adhesive plaster; nor did Mr. Samuel Sharp attach any other meaning to the phrase, which he sets down as highly ridiculous, as there is no sewing employed. For the following remarks, I am indebted to Mr. Carwardine, of Earls Colne Priory, near Halsted, Essex. Alluding to what was stated in the last edition of this Dictionary, concerning the dry suture, he observes, "you do not appear to be aware any more than Mr. Sharp, of the precise mode of its application, or why it was so called. Indeed, it is a curious circumstance, how this method of dry suture should have been so lost, as not to be described by any modern surgeons, who laugh at the very term, speaking of it as a mere application of a strip of adhesive plaster. In the *sutura sicca*, so called in opposition to the *sutura cruenta*, where blood followed the needle, some adhesive plaster was spread on linen, having a selvage. A piece of this was applied along each side of the wound (the selvages being opposed to each other,) and then drawn together by sewing them with a common needle, without bloodshed. Hence the term *sutura sicca*. The dry suture was used in all wounds of the face to avoid scars. You will find it thus described by our countryman Thomas Gale in his Enceiridion, 1563; and also by A. Parey, who gives a figure of it in his folio work, 1579." I feel much obliged to my friend Mr. Carwardine for this explanation, without which the expression *dry suture* is undoubtedly absurd. As the common way of dressing wounds with sticking plaster will come under consideration in a future part of this work, (see *Wounds*,) I shall not here detain the reader upon that topic.

Sutures, by which I mean such as were made in the flesh with a needle and ligature, were much more frequently employed by the old surgeons, than they are by the moderns. The best practitioners of the present day never resort to this method of holding the sides of a wound in contact, except in cases in which there is a real necessity for it, and other modes will not suffice.

There were, indeed, certain instances, in which the employment of sutures was long ago forbidden. Of this kind were envenomed wounds, in which accidents the destruction of the poison always formed a principal indication in the treatment.—Wounds, accompanied with considerable inflammation, were not deemed proper for the use of sutures, as the stitches had a tendency to increase the inflammatory symptoms. Also, as contused wounds necessarily suppurated, and, consequently, could not be united, sutures were not recommended for them; nor were they judged expedient for wounds attended with such a loss of substance as prevented their lips from being placed in contact. Formerly, wounds penetrating the chest, were not united by sutures; nor were those in which large blood-vessels were injured; at least, until all danger of hemorrhage was obviated by the vessels being tied.

Dionis believed, with several other authors, that wounds should not be united, when bones were exposed, on account of the exfoliations which might be expected. This precept is no longer valid; for when bones are neither altered nor diseased, and are only simply denuded, or divided with a cutting instrument, no exfoliations will commonly follow, if the surgeon take care to replace the fresh-cut soft parts so as to cover the exposed portion of the bone. The practicableness of uniting wounds, attended with the division of a bone, is confirmed by numerous facts. De la Peyronie communicated to the French Academy of Surgery, a case conclusive on this point. A man was wounded with a cutting instrument, in an oblique direction, on the external and middle part of the arm. The bone was completely cut through, together with the integuments and muscles, in such a manner that the arm only hung by an undivided portion of the skin, about an inch wide, under which were the large vessels. De la Peyronie tried to unite the parts, being convinced that it would be time enough to amputate afterward, if the case should require it. He placed the two extremities of the divided bone in their natural situation; made several sutures for promoting the union of the soft parts, and applied a bandage to the fracture. In this bandage there were slits, or apertures, over the wound, to allow the dressings to be applied. Spirit of wine, containing a little muriate of ammonia, was used as a topical application, and the forearm and hand, which were cold, livid, and insensible, were also fomented with the same. By these means the natural warmth was restored, and the wound was dressed. In a week the dressings were removed, through the opening in the bandage; in a fortnight they were changed a second time, and the wound seemed disposed to heal. On the eighteenth day, the healing had made considerable progress; the part had a natural appearance; and the beating of the pulse was very perceptible. De la Peyronie now substituted a common roller for the preceding bandage, and care was taken to change the dressings every ten days. In about seven weeks all applications were left off, and at the end of two months the patient was quite well, with the exception of a little numbness in the part. This case is one of the most important in all the records of surgery; for it displays, in a most striking manner, what very bad wounds it is the duty of the surgeon to attempt to unite; and above all, it exemplifies the propriety of attempting to save many compound fractures, which, judged of only from first appearances, would lead almost any one to resort to amputation. In such cases, when the divided parts are put in contact, the appearances are quite altered.

From what has been already stated, it appears that surgeons, a considerable time back, did not at once sew up every sort of wound; though the considerations, which led them not to close the wound, were erroneous, as may, perhaps, be said with respect to the apprehension of bleeding and exfoliations. The best modern practitioners employ sutures much less frequently than their predecessors. Pibrac's dissertation on the abuse of sutures, inserted in the third volume of the Memoirs of the Academy of Surgery, has had considerable effect in producing this change, and I may safely add, this improvement in practice. This judicious and enlightened practitioner opposed the method of uniting wounds by means of sutures, which, he contended, ought never to be adopted in practice, except in certain cases in which it was absolutely impossible to keep the sides of the wound in contact, by means of a suitable posture, and the aid of a methodical bandage. Such circumstances Pibrac represents as exceedingly rare; if they ever occur at all. He speaks of sutures as seldom fulfilling the intention of the surgeon, who, in the majority of cases in which he employs them, finds himself necessitated to remove them, before they have accomplished the wished-for end. Pibrac believes that sutures are generally more hurtful than conducive to the union of wounds; and that when they succeed, they do not effect a cure more speedily than a proper bandage. He cites numerous cases of very extensive wounds of the abdomen, neck, &c. for the cure of which a bandage proved effectual, and this even in many instances in which sutures had previously failed, and cut their way through the flesh. Louis, who adopted the opinions of Pibrac, published in the fourth volume of *Mém. de l'Acad de Chirurgie*, a valuable dissertation, in which he endeavours to prove, that even the harelip can be better united, by means of the uniting bandage than sutures; a case, however, which the best modern surgeons very rightly agree to consider, for particular reasons elsewhere noticed, (see *Harelip*,) as an example, in which a suture is adviseable.

As far as I can judge, the fair statement of the matter is, that sutures are by no means requisite in the generality of wounds; but that there are particular cases, in which either their greater convenience, or superior efficacy, still makes them approved, and employed by all the most eminent practitioners of the present day. Since sutures cannot be practised, without additional wounds being made, and pain occasioned, and since the threads always act as extraneous bodies in the parts, exciting more or less inflammation and suppuration round them; there can be no doubt that their employment is invariably wrong, whenever the sides of a wound can be maintained in contact by less irritating means, with equal steadiness and security. For, what is it which generally counteracts the wishes of the surgeon, and renders his attempts to make the opposite surfaces of wounds grow together unavailing? Is not the general cause too high a degree of inflammation, which necessarily ends in suppuration? Are not sutures likely to augment inflammation, both by the additional wounds of the needles, and the still more pernicious irritation of the threads which always act as foreign bodies, sometimes producing not merely an increase of inflammation and suppuration in their track; but frequently such ulceration as enables them to cut their way out, or else sloughing of the parts; or, in particular constitutions, a very extensive erysipelatous redness.

In consequence of the ulcerative process, sutures very often cease to have the power of any longer keeping the edges of wounds in contact; as the observations of Pibrac, and, indeed, what every man may daily remark in practice, fully testify; and the violent inflammatory symptoms which are excited, frequently oblige the surgeon to cut the threads, and withdraw them altogether.

But, even admitting, that by the general adoption of sutures some wounds would be united, which could not be so were this means of accomplishing the union abandoned, still it must be allowed, on the other hand, that the cause of some wounds not uniting is entirely ascribable to the irritation occasioned by the sutures themselves. Hence, if it be only computed, that as many wounds are prevented from uniting by the irritation of sutures, as other wounds which are united by their means, and could be united by no other methods, we must still perceive, that mankind would be no sufferers, and surgery undergo no deterioration, were sutures altogether rejected from practice. I believe, however, that every man, who has had opportunities of observation, and has made use of them with an unprejudiced mind, will feel persuaded that more wounds are hindered from uniting by sutures, than such as are healed by them, and *could not be united by other* means.

But prudent practitioners are not obliged, either to condemn or praise the use of sutures, in every instance, without exception. Men of independent principles will always adopt the line of conduct which truth points out to them as that which is right; nor will they obstinately join Pibrac and Louis, in contending that sutures are always improper and disadvantageous, nor with other bigoted persons, who may use sutures in every kind of wound whatever. Perhaps, sutures are still rather too much employed, and, in all probability, will long be so. It will be difficult entirely to eradicate the prejudices, on which their too frequent use is founded, as long as, what may be called, the teachers of surgery are seen holding up the practice for imitation in every principal hospital in the kingdom. Such surgeons, however, as are ready to imbibe fair and candid sentiments on the subject, and to qualify themselves for practising this part of surgery with judgment, should by no means neglect to read both what Pibrac and Louis have written on the subject. I know that the latter authors are a little too sanguine in their representations; but, as I have already remarked, sutures are still rather too much used, and something is yet necessary to do away a certain unwarranted habit of having recourse to them without real necessity. Nothing will tend to produce this desirable change so much, as the perusal of every argument against their employment.

I am decidedly of opinion, not from what I have read, but what I have actually seen, that the sides of the generality of wounds are capable of being effectually kept in contact, by means of a proper position of the part, and the aid of strips of adhesive plaster, compresses, and a bandage. I believe that such success can be obtained with every advantage which can be urged in favour of sutures, and without their disadvantages; such as greater pain, inflammation, &c. I even think, with Louis, that the harelip might in general be united very well by means of a bandage; but still I am of opinion, that the twisted suture is attended with least trouble, is most suited for universal practice, and that, unless such pains were taken as many practitioners would not, and others could never take, the method by bandage would frequently fail.

I find it exceedingly difficult to lay down any fixed principles for the guidance of the surgeon, in respect to when he ought, and when he ought not, to use sutures.

Perhaps, sutures should be made use of for all cuts and wounds, which occur in parts which are subject to an unusual degree of motion, such as would be apt to derange the operation of bandages, sticking plaster, and compresses. Hence the propriety of using the twisted suture for the harelip.

Sutures are probably, for the most part, advantageous in all wounds of the abdomen, of a certain length, and attended with hazard of the viscera making a protrusion. In this situation, the continual motion and action of the abdominal muscles, in respiration, besides the tendency of the viscera to protrude, may be a reason in favour of the use of sutures.

When two fresh-cut surfaces positively cannot be brought into contact by sticking plaster, bandages, the observance of a proper posture, &c. there can be no doubt of the advantage of using sutures, if they will answer the purpose. Some wounds of the trachea; some wounds made for the cure of certain fistulous communications between the vagina and bladder, or others for the cure of similar affections in the perinæum, afford instances of cases to which I allude.

I observe, that many surgeons in this metropolis use sutures for bringing the sides of the wound together after several operations; as that of removing a diseased breast, castration, and operations for strangulated hernia.

The reason for using sutures in the scrotum, I suppose, arises from the difficulty of keeping the edges of the wound in contact, owing to the great quantity and looseness of the part. In this case, I cannot determine whether sutures are really necessary or not; but, after the amputation of the breast, I have no hesitation in pronouncing their employment wrong and injudicious.

I shall conclude with referring to what Pibrac and Louis have written on the above subjects, in *Mém. de l'Acad. de Chir. Tom.* 3 *and* 4, *Sharp, Dionis, Gooch, Le Dran, Bertrandi, Sabatier, B. Bell, and J. Bell, have all treated of sutures.* See also *C. E. Boecler, Suturæ Vulnerum; Upsal*, 1772.

SYMPATHETIC BUBO. See *Bubo.*

SYNCHYSIS. (from συγχυω. to confound.) The term *synchysis* sometimes denotes the confusion of the humours of the eye occasioned by blows, and attended with a rupture of the internal membranes and capsules. Beer understands by the expression, a dissolution of the vitreous humour, or the state of it in which its consistence is entirely destroyed. (See *Lehre von den Augenkr. B.* 2, *p.* 257.)

SYNECHIA. The case in which the iris adheres to the cornea is termed *synechia anterior;* that in which the uvea adheres to the capsule of the lens, *synechia posterior.* Beer has delivered two valuable chapters on these subjects. The synechia posterior, on account of the frequent delicacy of the adhesions, is apt not to be detected, unless the eye be examined with particular care. A magnifying glass should be used, and the pupil be first dilated with hyosciamus, or belladonna. The treatment, as far as the prevention and removal of such adhesions are practicable, strictly belongs to the subject of iritis. (See *Ophthalmy.*) With the view of dispersing them, Beer praises the good effects of applying to the eye itself ointments containing preparations of mercury, or a collyrium hydrarg. oxymuriatis, to which some of the thebaic tincture is added. As an inward medicine, he says, calomel is the most effectual. When eye-salves are used, Beer recommends a little of the extract of hyosciamus to be mixed with them, so that they may dilate the pupil, and thus suddenly break any slight threads of lymph. (*B.* 2, *p.* 58.) For additional information on the synechia posterior and anterior, see *Lehre von den Augenkr. B.* 2, *p.* 54 *and p.* 263. Also *Beger, De Synechia seu preternaturali adhesione corneæ cum iride. Haller, Disp. Chir. T.* 1, *p.* 435.

SYNTHESIS. (from συν, together, and θεσις, position, situation.) A generic term, formerly much used in the schools of surgery, and comprehending every operation, by which parts, which had been divided, were reunited.

SYPHILIS. Lues Venerea. The venereal disease. (See *Venereal Disease.*)

T.

T BANDAGE. A bandage, so named from its figure. It is principally used for supporting the dressings after the operation for the cure of fistula in ano, in diseases of the perinæum, and those of the groins, anus, &c. It is composed of two longitudinal pieces of cloth, of greater or lesser breadth, according as occasion requires. The transverse piece of cloth serves to go round the body above the hips: the perpendicular piece is sewed at one of its ends to the middle of the latter; and in general, its other extremity is slit into two portions, or tails, about six or eight inches long. The perpendicular piece of the T bandage applies itself between the glutæi muscles, and to the perinæum: while its two ends, just described, are to be carried between the thighs and the pudenda to the right and left, and fastened to the transverse piece surrounding the body. Besides the common T bandage, there is another one named *double*, which has two perpendicular pieces, sewed to the transverse one, about four inches apart. The double T bandage is said to be more particularly applicable after lithotomy, and for the diseases of the perinæum; because one may make the two perpendicular pieces cross each other on the part affected, and leave the anus uncovered; an advantage which the simple T bandage certainly has not. The T bandage may be used in some other ways, which have been noticed in the article *Bandage*.

TALPA. (a mole.) A tumour which creeps under the skin as a mole under the surface of the ground. Such is the etymology. It is often applied to an encysted tumour, which forms on the head, and contains a paplike matter. (See *Atheroma*, and *Tumours, Encysted*.)

TAPPING. See *Paracentesis*.

TARAXIS. (from *ταρασσω*, to disturb.) A slight ophthalmy or inflammation of the eye.

TAXIS. (from *τασσω*, to put in order.) The operation of reducing a hernia with the hand. (See *Hernia*.)

TENDONS, RUPTURE OF. The tendons liable to be broken by the violent action of the muscles with which they are connected, are the tendo Achillis, that of the extensor muscles of the leg, and the tendon of the triceps extensor cubiti. The ancient surgeons seem not to have been well acquainted with the rupture of the tendo Achillis, which they probably might mistake for a sprain, or some other complaint. In cases in which this part had been cut, they recommended approximating the separated portions, and maintaining them in contact by means of a suture.

When the ruptured tendo Achillis was afterward better understood, the plan just mentioned was even adopted in this case, the integuments having been previously divided, for the purpose of bringing the tendon into view. But there is no necessity for having recourse to this painful proceeding. (*Encyclopedie Méthodique, Partie Chir. T.* 1, *p.* 55.)

The superficial situation of the tendo Achillis always renders the diagnosis of its rupture exceedingly obvious, and the accident can only become at all difficult to detect, when there is a considerable degree of swelling, which is very rare. When the tendon has been cut, the division of the skin even allows the accident to be seen. When the tendon has been ruptured, the patient hears a sound, like that of the smack of a whip, at the moment of the occurrence. In whatever way the tendon has been divided, there is a sudden incapacity, or at least, an extreme difficulty either of standing or walking. Hence, the patient falls down, and cannot get up again. Besides these symptoms, there is a very palpable depression between the ends of the tendon, which depression is increased when the foot is bent and diminished, or even quite removed when the foot is extended.

The patient can spontaneously bend his foot, none of the flexor muscles being interested. The power of extending the foot also is still possible, as the peronæi muscles, the tibialis posticus, and long flexors of the toes (see *a case recorded by J. L. Petit*) remain perfect, and may perform this motion. (*Œuvres Chir. de Desault, par Bichat, T.* 1.)

The indications are to bring the ends of the divided part together, and to keep them so, until they have become firmly united. The first object is easily fulfilled, by putting the foot in a state of complete extension; the second, namely, that of keeping the ends of the tendon in contact, is more difficult.

In order to have a right comprehension of the indications, we should consider what keeps the ends of the tendon from being in contact. The flexion of the foot has this effect on the lower portion; the contraction of the gastrocnemius, and solæus, on the upper one. The indications then are to put the foot in an unalterable state of extension, and to counteract the action of the above muscles.

The action of the muscles may be opposed:—1. By keeping these powers in a continual state of relaxation. For this purpose the leg must be kept half bent upon the thigh. 2. By applying methodical pressure to the muscles; methodical, because it is to operate on the fleshy portion of the muscles, and not on the tendon, the ends of which, being depressed by it, would be separated from each other, and, instead of growing together, would unite to the adjacent parts. The pressure should also operate, so as to prevent the ends of the tendon from inclining either to the right or left.

J. L. Petit seems entitled to the honour of having first devised the plan of treating the ruptured or divided tendo Achillis, by keeping the leg and foot in a particular posture, with the aid of an apparatus. Seeing that the extension of the foot brought the ends of the tendon into contact, it occurred to him, that such extension should be maintained during the whole of the treatment, in order to bring about a permanent union. This aim is, in fact, the common basis of all the numerous methods of cure, which have been since recommended.

Dr. Alexander Monro, primus, happened to rupture his tendo Achillis. When the accident took place, he heard a loud crack, as if he had suddenly broken a nut with his heel, and he experienced a sensation as if the heel of his shoe had made a hole in the floor. This sensation, he says, has also been observed by others, though some have complained of a smart stroke, like what would be produced by a stone or cane. Immediately suspecting what had happened, the doctor extended his left foot, in which the occurrence had taken place, as strongly as he could with his right hand, while with the left he pressed the muscles of the calf downward, so as to bring the ends of the broken tendon as near together as possible. In this position he sat, until two surgeons came to his assistance. They applied compresses, and a bent board to the upper part of the foot and forepart of the leg, both which they kept, as nearly as possible, in a straight line, by a tight bandage made with a long roller. But as this mode of dressing soon became very uneasy, it was changed for the following one. A foot-sock, or slipper, was made of double quilted ticking, from the heel of which a belt or strap projected, of sufficient length to come up over the calf of the leg. A strong piece of the same materials was prepared of sufficient breadth to surround the calf, and this was fastened with lacings. On the back part of this was a buckle, through which the strap of the foot-sock was passed, so that the foot could be extended, and the calf brought down at pleasure. The leg and foot were wrapt up in soft flannel, fumigated with benzoin, and the bandage was kept on day and night, the belt being made tighter when the doctor was about to go to sleep, and loosened when he was awake, and on his guard. For a fortnight he did not move his foot and leg at all, but was conveyed in a chair on castors from one part of the room to another. After this, he began to move the ankle-joint, but in such a gentle manner as not to give any pain. The degree of motion was gradually increased as the tendon became capable of bearing it, care being taken to stop when the motion began to create uneasiness. The affected limb was moved in this way for half an hour at a time. In a few days the hollow, between the separated ends of the tendon became imperceptible, though the part continued soft much longer. It became, however, gradually thicker and harder, until a knot was at last formed in it, apparently of a cartilaginous nature. Though this was at first as large as a middling plum, and gradually became softer and smaller, yet it did not disappear entirely. Having occasion to go out six weeks after the accident, the doctor put on a pair of shoes, with heels two inches high, and contrived a steel machine to keep his foot in the proper position. This machine, however, he afterward changed for another, made of the same materials as the former. It was not till five months after the accident, that he thought proper to lay aside all assistance, and to put the strength of the tendon to a trial. (See *Monro's Works*, p. 661.)

Both in a wound and rupture in the tendo Achillis, the ancient method of using a suture for keeping the ends of the tendon in contact, is at present quite exploded, and position of the limb is the grand agent, by which the cure is now universally accomplished. The following was Desault's method, which, though it was expressly designed to fill all the above-mentioned indications, may not be a more valuable practical plan than what was adopted by Dr. Monro. After the ends of the tendon had been brought into contact by moderate flexion of the knee, and complete extension of the foot, Desault used to fill up the hollows on each side of the tendon, with soft lint and compresses. The roller, applied to the limb, made as much pressure on these compresses as on the tendon; and hence, this part could not be depressed too much against the subjacent parts. Desault next took a compress about two inches broad, and long enough to reach from the toes to the middle of the thigh, and placed it under the foot, over the back of the leg and lower part of the thigh. He then began to apply a few circles of a roller round the end of the foot, so as to fix the lower extremity of the longitudinal compress. After covering the whole foot with the roller, he used to make the bandage describe the figure of 8, passing it under the foot, and across the place where the tendon was ruptured; and the method was finished by encircling the limb upward with the roller, as far as the upper end of the longitudinal compress. (See *Monro's Works. Encyclopedie Méthodique, article Achille, tendon de, and Memoire sur la Division du Tendon d'Achille, in Œuvres Chirurgicales de Desault, par Bichat, T.* 1, *p.* 306.)

A rupture of the tendon of the extensor muscles of the leg, would require nearly the same kind of treatment as a fracture of the patella. However, pressure exactly on the broken part of the tendon should be avoided, the limb should be kept extended, and somewhat raised; a bandage might be put round the thigh, and antiphlogistic treatment be at first adopted. In the course of two or three weeks, the surgeon should cause the joint to be very gently moved, without any muscular exertion on the part of the patient himself. When the tendon of the triceps extensor cubiti is ruptured, the limb is to be kept straight; cold applications are to be used for a few days, and if necessary, strict antiphlogistic treatment pursued.

TENT. A roll of lint for dilating openings, sinuses, &c.

TEREBELLA. (dim. of *terebra*, a perforating instrument.) A trepan, or instrument for sawing out circular portions of the skull. A trephine.

TEREBRA. (from τερεω, to bore.) A trepan, or trephine. Also an instrument called a perforator.

TESTICLE, DISEASES OF. For an account of many of these affections, I must refer to distinct articles in this Dictionary; for instance, *Cirsocele, Fungus Hæmatodes, Hernia Humoralis, Hæmatocele, Hydrocele, &c.*

Mr. Pott defines *sarcocele* to be a disease of the body of the testicle, and, as the term implies, it consists, in general, in such an alteration, made in the structure of that organ, as produces a resemblance to a hard, fleshy substance, instead of that fine, soft, vascular texture, which it naturally presents. "*Sarcocele* (says Callisen) is a name applied to every chronic swelling of the testicle, attended with a total, or partial, conversion of the part into an heterogeneous substance." (*Systema Chirurgiæ Hodiernæ, Pars* 2, *p.* 144.) According to these definitions, sarcocele becomes a term admitting of almost general application to the morbid affections of the testicle, since most of them are attended with induration and swelling of the part. In fact, we find that the old writers, and a great many of the moderns, call all diseased indurations and enlargements of the testicle *sarcoceles*, whether the disorder be a simple, chronic, indolent tumour, unaccompanied with any symptoms of specific disease, or malignancy, or whether it be a scrofulous, or, what is still more different and more serious, a truly scirrhous disorder of the organ. Even the fungus hæmatodes of the testicle was, until lately, often termed sarcocele.

That this vague method of employing the word sarcocele can be attended with no advantage, but, on the contrary, must have a tendency to destroy all useful discrimination, is a proposition, the truth of which is self-evident. I am well aware, that Mr. Pott, and many late writers, set out with an idea that every sarcocele has a propensity to change into scirrhus, and actual carcinoma, and, therefore, the latter states are considered by these authors only as stages of the same disease. Indeed, it is universally admitted by the best and most experienced observers, that a common indolent sarcocele, a simple fleshy enlargement of the testicle, may change into the peculiar malignant disease, called scirrhus, or cancer. But yet it is by no means proved, that all the diseases which are comprehended under the name of sarcocele, are accompanied with a risk of their assuming the nature of scirrhus and cancer; for nothing can be more certain, than that the enlargement of the testicle, produced by fungus hæmatodes, is, from the first to the last, always of one character, and can never change into ordinary scirrhus, or carcinoma. Neither do indolent scrofulous swellings of this organ ever undergo such an alteration as to deserve the epithets of *scirrhous* and *cancerous*. In opposition to the belief of Mr. Hunter, (*see his Treatise on the Venereal Disease*, *p.* 59,) some surgeons still imagine, that there is really one kind of chronic enlargement of the testicle, arising from a venereal cause. (*Roux, Parallèle de la Chirurgie Angloise, &c. p.* 305. *Richerand, Nosographie Chir. T.* 4, *p.* 300, *Edit.* 4.) Now this also has usually been called a sarcocele; it was so named by Pott himself, and if there be such a case, no one will suppose that it, or any other form of lues venerea, is capable of changing into a true scirrhous or cancerous disease. Perhaps, therefore, it might be more consistent and advantageous to restrict the appellation of *sarcocele* to an indolent fleshy enlargement of the testicle, unaccompanied with any present symptoms of malignancy, or any marks of its being the effect of a specific disease; and as soon as the case evinces another character, the name should correspond with the particular nature of the disease.

We need not here enter into a minute account of the various sarcomatous diseases, to which the testicle is subject; for, they have no peculiarity in them, except what depends upon their situation, and the general characters of the different species of sarcoma will be considered in a future article. (See *Tumour.*) The testicle is especially liable to three kinds of sarcoma, which have been named, by Mr. Abernethy, the *common vascular*, the *cystic*, and the *medullary*. The latter case, however, which is often called *soft cancer of the testicle*, I shall describe in the present article, in order that the reader may judge whether there is any material difference between this case and another distemper to which the testicle is subject. (See *Fungus Hæmatodes*.) Sometimes the testicle is converted into a truly *scrofulous* mass. It is increased in size, and when cut into, a whitish, or yellowish coagulated matter is discovered, mixed with pus. The complaint is not attended with so much pain and induration as a scirrhous disorder of the testicle; nor does it produce any unfavourable state of the health.

As Dr. Baillie observes, the testicle is often found converted into a hard mass, of a brownish colour, and generally intersected with membranes. Sometimes, there are cells in the tumour, which are filled with a sanious fluid. (*Morbid Anatomy, &c. p.* 352, 353, *Edit.* 2.) This is the truly *scirrhous testicle*, which is attended with great hardness, severe pains darting along the spermatic chord to the loins, and an unequal knotty feel. In general the health becomes impaired. To use Mr. Pott's words, sometimes the fury of the disease brooks no restraint; but, making its way through all the membranes, which envelope the testicle, it either produces a large, foul, stinking, phagedenic ulcer, with hard edges, or it thrusts forth a painful gleeting fungus, subject to frequent hemorrhage. (*Pott's Chirurgical Works, Vol.* 2, *p.* 390, *Edit.* 1808.) These latter states of the disease are denominated *cancer of the testicle.*

Sooner or later, the scirrhous induration extends from the epididymis upward along the spermatic chord, even within the abdominal ring. In the latter circumstance, the lymphatic glands in the groin usually become diseased; and this extension of mischief, together with the impossibility of removing the whole of the diseased chord, too frequently deprives the patient of every chance of getting well.

I have already stated, that some of the most simple sarcomatous enlargements of the testicle are capable of assuming, in a very sudden manner, a malignant and cancerous tendency; and that sometimes the scirrhous induration of the chord makes a rapid progress upward. Hence, that surgeon acts with prudence, who recommends the early extirpation of every testicle, which is incurably diseased, and so deprived of its original organization, as to be totally unfit for the secretion of the semen.

Chronic enlargements of the testicle are sometimes attended with an accumulation of limpid fluid in the tunica vaginalis, and the disease is then termed, *hydrosarcocele*, an appellation first employed by Fabricius ab Aquapendente.

The hardness and swelling of the epididymis, remaining after an acute inflammation of the testicle (see *Hernia Humoralis*,) do not constitute a complaint, which surgical authors class with sarcocele; for, the disease hardly ever increases so as to give trouble.

I have stated, that sarcoceles, in common with the generality of other sarcomatous tumours, may change into distempers, which, in point of malignity, and the manner in which they injure the health, are quite as bad as cancer itself. It is said, however, that sarcocele of the epididymis rarely becomes malignant, and is much more easy of cure, than the same disease of the glandular portion of the testicle; but both parts are often diseased together.

Sarcoceles sometimes continue for years, without undergoing any particular change; in other instances, they increase with surprising rapidity. The inconveniences, which they excite, often proceed chiefly from their weight and magnitude: their weight occasions an uneasy, and even a painful sensation in the loins, especially when the patient neglects to wear a suspensory bandage, or a bag truss for the support of the part. The danger of a sarcocele arises from the increase and extension of the hardness up the spermatic chord, and from the change of the tumour from its indolent state into a painful, ulcerated, and incurable disease.

A sarcocele sometimes bears a resemblance to hydrocele of the tunica vaginalis. It sometimes has the usual pyramidal shape of the latter disease, and, like it, is always situated at the lower end of the spermatic chord. The chief difference between the two cases seems to be, that the sarcocele is hard, while the hydrocele has a soft, yielding, elastic feel. It should be known, however, that the fungus hæmatodes of the testicle is remarkable for the deceitful feel of fluctuation and elasticity, which it presents; and every surgeon ought to be aware, that a sarcocele is not always particularly hard, and that hydroceles are sometimes exceedingly indurated. The sarcocele, indeed, is not transparent; neither is the hydrocele in certain instances; and these are cases, in which a mistake may easily be made. Still, with due attention, both diseases may be discriminated with tolerable precision. The sarcocele, when held in the surgeon's hand, seems heavier than the hydrocele. Every part of a diseased testicle is seldom equally indurated, so that the sarcocele is usually much softer in some places than others. The hydrocele presents the same kind of feel at every point, except behind, where the testicle is felt. When, in the case of hydrocele, pressure is made in this latter situation, the patient experiences a much more acute sensation, than when the pressure is made upon any other part of the tumour; but, in the example of sarcocele, the patient commonly has the same kind of feel, let the pressure be applied to any part of the swelling whatsoever. When the upper portion of the spermatic chord can be felt, and it seems quite hard and thickened, the surgeon has reason for suspecting the case to be a sarcocele. Lastly, though a hydrocele, when gently handled, may seem very hard, yet, on being more strongly compressed, it will generally betray a soft, elastic feel, which, excepting instances of fungus hæmatodes, is never the case with an indurated sarcocele.

It has been already explained, that a sarcocele is sometimes conjoined with a hydrocele, which case is well known among surgeons by the appellation of *hydro-sarcocele*. As the diseased testicle is then surrounded with fluid, it cannot be felt and examined by the fingers. However, when an unusual degree of hardness is perceptible at the back part of the tumour, where the testicle is situated, or when the upper portion of the spermatic chord is found to be quite indurated, there is reason for suspecting that the testicle is diseased. The sarcocele also is commonly the original and principal complaint, the hydrocele not occurring till some time after the enlargement of the testicle.

In some unusual cases, the substance of the scrotum is converted into an indurated mass, which occasionally attains a vast size, and presents the appearance of an enormous sarcocele. An example in which the tumour weighed 70lb. has been lately published by Dr. Titley. (See *Med. Chir. Trans. Vol.* 6, *p.* 73.) In one case, recorded by Dr. Cheston, a swelling of this kind was as large as a child's head. On dissection of the parts, the testicle and tunica vaginalis were found to be quite free from disease. The tumour proceeded entirely from an induration of the cellular membrane, which immediately covers the external surface of the vaginal coat. This curious disease is more common in warm climates, and several instances of it were met with in Egypt by Baron Larrey. (See *Mem. de Chir. Militaire, T.* 2, *p.* 110, *et seq.*) Some interesting particulars relative to it will be found in another part of this Dictionary. (See *Scrotum.*)

The operation of castration is the most certain means of relieving the patient from sarcocele. This measure, however, is not invariably practicable, nor is it always necessary; for, sometimes the induration of the testicle admits of being dispersed by the judicious employment of internal medicines and external applications. The hope of accomplishing this desirable object may be reasonably entertained, when the swelling is not very large, when it has not existed a considerable time, and when it is not attended with very great induration. Experience has proved, that some kinds of sarcocele have yielded to the exhibition of emetics, (*Warner, Pringle, and Home in Chymical Experiments;*) to a decoction of ononis spinos. (*Bergius Mat. Med. Richter's Chir. Bibl.* 7 *B. p.* 605;) to cicuta and bark (*Warner;*) to mercurial frictions (*Le Dran, B. Bell, Richerand, Delpech;*) to the external use of the liquor ammon. acetatis (*Richter's Chir. Bibl. B. p.* 127;) to poultices containing opium (*Fothergill, in Med. Obs. & Inq. Vol.* 5;) to a lotion made of a strong decoction of hemlock (*Warner;*) to the steam of vinegar, the repeated employment of leeches, and the application of cold, &c. The operation of all these means will be advantageously assisted by the continual use of a bag-truss, the observance as much as possible of an horizontal position, and attention to a suitable low diet.

Mr. Pott believed, that the man who has the misfortune to be afflicted with a sarcocele, has very little chance of getting rid of the disease by any plan except extirpation; and all the time the operation is deferred, he carries about him a part, not only useless but burdensome, and which is every day liable to become worse, and unfit for such an operation. Now, although there is a great deal of truth in this opinion, yet, I conceive, it is rather exaggerated, and that it would tend to authorize the practice of castration to an extent beyond all necessity. I certainly think, with Mr. Pott, that there never was a sarcocele cured, where the organization of the testicle had been destroyed by disease, or where its structure had suffered so much as to render it incapable of the office for which it is destined. But such state cannot always be known by inspection or manual examination, and were a surgeon to condemn to the knife every testicle which he finds affected with indolent swelling and induration, he would remove many which, under some of the above plans of treatment, might be perfectly cured. That there are some chronic enlargements of the testicle which may be resolved, is a truth of which experience must have convinced the generality of surgeons.

The scrofulous induration, and several other swellings of this organ, which are very imperfectly understood, may sometimes be benefited, and even entirely cured, just like some analogous affections of the breast. What is termed the *venereal sarcocele* (Mr. Pott allows) always gives way to a mercurial course properly conducted. The diagnosis of this case, it must be confessed, is not very clearly explained by surgical writers, nor was its reality acknowledged by Mr. Hunter. According to Mr. Pott, it is seldom an early symptom, and he does not remember ever to have seen an instance in which it was not either immediately preceded, or accompanied by some other appearances plainly venereal. He adds, that it has neither the inequality nor darting pains of scirrhus. But the question, whether the case is truly syphilitic or not, is far less interesting than the question, whether there are not many sarcoceles which may be diminished and cured by mercury? The affirmative cannot be questioned. I have seen many such cases myself, and there are numerous examples on record. A statement of several has been lately published by Richerand. (See *Nosographie Chirurgicale, T.* 4, *p.* 300, *et seq. Edit.* 4.) The authority of Delpech is also on the same side. *Précis Elémentaire des Maladies Reputées, Chir. T.* 3, *p.* 564.) Indeed this last writer maintains, that many common sarcoceles and scirrhi of the testicle are so much alike in their symptoms, that the difference of their nature cannot always be at once detected by the practitioner. Hence, although I am an advocate for the early performance of castration in cases of sarcocele, where there is reason to suppose the disease so far advanced, that the organization of the testicle is totally destroyed; or where internal and external remedies have been tried a certain time in vain; yet these sentiments do not incline me to recommend the operation for other examples in which the disease is quite recent, and no plan of treatment whatsoever has been fairly tried. I have already enumerated various plans of treatment, which have been proved by experience to be sometimes capable of affording relief. The disease of the testicle, which is usually called the *scrofulous sarcocele*, like other forms of scrofula, often gets well spontaneously after a certain time, and it may frequently be considerably benefited by administering internally the conium maculatum, and small doses of the submuriate of mercury; lotions of sea-water, or poultices of sea-weeds, being applied to the scrotum. Several other indolent enlargements of the testicle yield to frictions with camphorated mercurial ointment on the scrotum. The late Mr. Ramsden thought that some sarcoceles might be relieved by removing with bougies a supposed morbid irritability of the urethra, with which his theories led him to connect the origin of the complaint. (See *Pract. Obs. on Sclerocele, &c.*) The novelty of this suggestion for a time attracted considerable notice; but the interest which it once excited has now died away; a sufficient proof to my mind, that the practice inculcated was not of much value.

From the preceding observations, it may be inferred, that all chronic enlargements of the testicles are not incurable; but that we ought at the same time to be duly impressed with the expediency of not wasting too much time in the trial of means which are not to be depended upon, and which, if continued immoderately long, might allow the disease to advance too far to be capable of being afterward effectually extirpated. According to Mr. Pott, the circumstances in which the operation of castration is adviseable, or not, are of two kinds, and relate either to the general habit of the patient, and the disorders and indispositions of some of the viscera, or to the state of the testicle and spermatic chord.

A pale, sallow complexion in those who used to look otherwise; a wan countenance, and loss of appetite and flesh, without any acute disorder; a fever of the hectic kind; and frequent pain in the back and bowels are, in those who are afflicted with a scirrhous testicle, such circumstances as would induce a suspicion of some latent mischief in some of the viscera; in which case, as Mr. Pott truly observes, success from the mere removal of the testicle is not to be expected. They whose constitutions are spoiled by intemperance, previous to their being attacked with this disease; who have hard livers, and anasarcous limbs; he says, are not proper subjects for such an operation. Hard tumours within the abdomen, in the regions of the liver, spleen, kidneys, or mesentery, implying a diseased state of the said viscera, are very material objections to the removal of the local evil in the scrotum. In short, whenever there are manifest appearances, or symptoms of a truly diseased state of any of the principal viscera, the success of the operation becomes very doubtful.

“ The state of the mere testis can hardly ever be any objection to the operation; the sole consideration is the spermatic chord: if this be in a natural state, and free from disease, the operation not only may, but ought to be performed, let the condition of the testicle be what it may; if the spermatic chord be really diseased, the operation ought not to be attempted.” And Mr. Pott afterward remarks, “ when the spermatic vessels are not only turgid and full, but firm and hard; when the membrane which invests and connects them has lost its natural softness and cellular texture, and has contracted such a state, and such adhesions as not only greatly to exceed its natural size, but to become unequal, knotty, and painful, upon being handled, and this state has possessed all that part of the chord which is between the opening in the oblique muscle and the testicle, no prudent, judicious, or humane man, will attempt the operation; because he will, most certainly, not only do no good to his patient, but will bring on such symptoms as will most rapidly, as well as painfully destroy him.”

“ On the other hand,” says Pott, “ every enlargement of the spermatic chord is not of this kind, nor by any means sufficient to prohibit or prevent the operation.

“ These alterations or enlargements arise from two causes, viz. a varicose dilatation of the spermatic vein, and a collection, or collections, of fluid in the membrane investing and enveloping the said vessels.” Shortly afterward the same practical writer continues:—“ The diseased state of a truly scirrhous testicle, its weight, and the alteration that must be made in the due and proper circulation of the blood, through both it and the vessels from which it is dependent, may and do concur in inducing a varicose dilatation of the spermatic vein, without producing that knotty, morbid alteration and hardness, which forbid our attempts. Between these, a judicious and experienced examiner will generally be able to distinguish.

“ In the former, (the truly diseased state) the chord is not only enlarged, but feels unequally hard and knotty; the parts of which it is composed are undistinguishably blended together; it is either immediately painful to the touch, or becomes so soon after being examined; the patient complains of frequent pains shooting up through his groin into his back; and from the diseased state of the membrane composing the tunica communis, such adhesions and connexions are sometimes contracted, as either fix the process in the groin, or render it difficult to get the finger and thumb quite round it.

“ In the other (the mere varicose distention) the vessels, though considerably enlarged and dilated, are nevertheless smooth, soft, and compressible; the whole process is loose and free, and will easily permit the fingers of an examiner to go quite round it, and to distinguish the parts of which it is composed; it is not painful to the touch; nor does the examination of it produce or occasion those darting pains which almost always attend handling a process malignantly indurated.”

Mr. Pott next explains that, “ in the cellular membrane, leading to a diseased testicle, it is no very uncommon thing to find collections of extravasated fluid. These, as they add considerably to the bulk and apparent size of the process, make the complaint appear more terrible; and, as I have just said, less likely to admit relief.

“ When the extravasation is general, through all the cells of the investing membrane, and the spermatic vessels themselves are hardened, knotty, and diseased, the case is without remedy; for, although a puncture, or an incision, will undoubtedly give discharge to some, or even the greatest part of the fluid; yet this extravasation is so small and so insignificant a circumstance of the disease, and the parts, in this state, are so little capable of bearing irritation, that an attempt of this kind must be ineffectual, and may prove mischievous.

“ But, on the other hand, collections of water are sometimes made in the same membrane, from an obstruction to the proper circulation through the numerous lymphatics in the spermatic process, while the vessels themselves are really not diseased, and therefore very capable of permitting the operation. In this case, the fluid is generally in one cyst, or bag, like to an encysted hydrocele, and the spermatic chord, cyst and all, are easily moveable from side to side; contrary to the preceding state in which the general load in the membrane fixes the whole process, and renders it almost immoveable.

"A discharge of the fluid will, in this case, enable the operator to examine the true state of the process, and, as I have twice or thrice seen, put it into his power to free his patient from one of the most terrible calamities which can befall a man." (See *Pott on Hydrocele, &c.*)

The testicle is subject to a disease often called *soft cancer*, which, though of a very malignant and incurable nature, is different from the true cancer, already described. It has been particularly noticed by Mr. Abernethy, under the name of *Medullary Sarcoma.* In most of the instances which this gentleman has seen, the tumour, when examined after removal, appeared to be of a whitish colour, resembling on a general and distant inspection, the appearance of the brain, and having a pulpy consistence. He has also often seen it of a brownish red appearance. The following case is related, to illustrate the nature and progress of the disease.

"A tall, thin, healthy-looking man, of about forty years of age, had, about fifteen years before, a swelled testicle from a gonorrhœa; the epididymis remained indurated. Six years afterward it became enlarged, and a hydrocele at the same time formed. Half a pint of water was discharged by a puncture, but inflammation succeeded the operation, and this testis became very large. An abscess formed, and burst in the front of the scrotum, and the testis subsided in some degree. Mercury was employed to reduce it, but without effect. The part, however, was indolent, and gave the patient no trouble but from its bulk.

"About a year afterward, a gland enlarged in the left groin, (the same side as the testis,) another then became swoln in the right groin, and in the course of two years, several glands in each groin had attained a very considerable magnitude. At this period, he was admitted into St. Bartholomew's Hospital, under the care of Mr. Long. The testis was, at this time, between four and five inches in length, and about three in breadth; it resembled its natural form, and was indolent in its disposition. The spermatic chord was thickened, but not much indurated. Four or five glands were enlarged in the groin on both sides; each of which was of the size of a very large orange; and when observed together, they formed a tumour of very uncommon shape and magnitude.

"They gradually increased in size for several months, till at last the skin appeared as if unable to contain them any longer. It became thin, inflamed, and ulcerated, first in the left groin, and thus exposed one of the most prominent tumours. The exposed tumour inflamed and sloughed progressively, till it entirely came away. As the sloughing exposed its vessels, which were large, they bled profusely, insomuch that the students endeavoured, but in vain, to secure them by ligatures: for the substance of the tumour was cut through, and torn away in the attempt. Pressure by the finger, continued for some time, was the only effectual mode of restraining this hemorrhage.

"The loss of one gland relieved the distended skin, which had only ulcerated on the most prominent part of the tumour, and had not become diseased. It now lost its inflamed aspect: granulations formed, and a cicatrix took place. In the opposite groin a similar occurrence happened. One gland, exposed by the ulceration of the skin, sloughed out, being attended by the circumstances just recited. However, before the skin was cicatrized, ulceration had again taken place in the right groin, in consequence of the great distention of the skin from the growth of the tumour; and sloughing had begun in the tumour, when the patient, whose vital powers had long been greatly exhausted, died." (See *Abernethy's Surgical Observations, &c.* 1804.)

The preceding kind of disease is now generally considered to be fungus hæmatodes. If there are any differences, they consist in the parts sloughing out, and then healing, instead of a fungus shooting out, and continually increasing in size. (See *Fungus Hæmatodes.*)

Dr. Baillie has noticed some affections, in which the testicle becomes bony, cartilaginous, &c.; but on these it is not necessary for us to dwell in this Dictionary. The preceding observations may be considered as relating expressly to the diseases for which castration is generally performed. (See *Castration.*)

Besides the fungus, which arises from the testicle in the advanced stage of carcinoma, and the bleeding fungous growth, which arises from this organ in the ulcerated state of fungus hæmatodes, there is another superficial fungous excrescence, to which the testicle is subject, and which is entirely free from all malignancy. The disease to which I refer, has been noticed by Callisen, under the name of *lipoma of the testicle.* "Si ex superficie albugineæ vel ipsa tunica vaginali excrescentiæ surgunt, totum demum testem involventes, et scirrhum seu fungum, mentientes, ipsius tamen testis substantia parum aut vix de statu naturali aberrante; malum naturam lipomatis sequitur, vix unquam in scirrhum et carcinoma abiens." (See *Systema Chirurgiæ Hodiernæ, Vol. 2, p.* 145, *Edit.* 1800.) The *superficial fungus*, or *lipoma of the testicle*, was noticed in an early edition of another publication, and described as "a particular affection of the testicle, in which a fungus grows from the glandular substance of this body, and in some instances, from the surface of the tunica albuginea. This excrescence is usually preceded by an enlargement of the testicle, in consequence of a bruise, or some species of external violence. A small abscess takes place and bursts, and from the ulcerated opening the fungus gradually protrudes." I then proceeded to represent how unnecessary and improper it was to extirpate the testicle, on account of this affection, if after the subsidence of the inflammation, the part should not seem much enlarged and indurated. I recommended the fungus to be cut off, or else destroyed with caustic; and I founded my advice on a successful attempt of the first kind, which was made in St. Bartholomew's Hospital, by Sir James Earle, a little while before my book was published. (See *First Lines of the Practice of Surgery*, p. 399.)

An interesting little paper has also been written on the subject, by my friend Mr. Lawrence, who has favoured the public with a more particular account, and nine cases illustrative of the causes, symptoms, and progress of the disorder. According to Mr. Lawrence, the patient generally assigns some blow, or other injury, as the cause of the complaint; in other instances, it originates in consequence of the hernia humoralis from gonorrhœa, and sometimes appears spontaneously. A painful swelling of the gland, particularly characterized by its hardness, is the first appearance of the disease. After a certain length of time, the scrotum, growing gradually thinner, ulcerates; but the opening which is thus formed, instead of discharging matter, gives issue to a firm, and generally insensible fungus. The surrounding integuments and cellular substance are thickened and indurated by the complaint, so that there appears to be altogether a considerable mass of disease. The pain abates, and the swelling subsides considerably, when the scrotum has given way. In this state, the disorder appears very indolent; but if the fungus be destroyed by any means, the integuments come together, and a cicatrix ensues, which is inseparably connected with the testicle. Mr. Lawrence next informs us, that if the part be examined while the fungus still remains, the excrescence is found to have its origin in the glandular substance of the testicle itself; that the coats of the part are destroyed to a certain extent; and that a protrusion of the tubuli seminiferi takes place through the aperture thus formed. Mr. Lawrence says, he has often ascertained the continuity of the excrescences with the pulpy substance of the testicle, of which more or less remains, according to the difference in the period of the disorder. The same gentleman thinks, that the glandular part of the testicle experiences an inflammatory affection in the first instance, in consequence of the violence inflicted on it; and that the confinement of the swollen substance, by the dense and unyielding tunica albuginea, sufficiently explains the peculiar hardness of the tumour, and the pain which is always attendant on this stage of the disorder. The absorption of the coats of the testis, and of the scrotum, obviates the tension of the parts, and thereby restores ease to the patient, at the same time that the fungus makes its appearance externally.

With regard to the treatment, Mr. Lawrence is of opinion, that if the complaint were entirely left to itself, the swelling would probably subside, the fungus shrink, and a complete cure ensue, without any professional assistance; but he adds, that the disorder is so indolent in this stage, that a spontaneous cure would not be accomplished till after much time. He says that the excrescence may be removed with a knife, or if the nature of its attachment permit, with a ligature, or that it may be destroyed with escharotic applications. Mr. Lawrence very judiciously gives the preference to removing the tumour to a level with the scrotum, by means of the knife, as the most expeditious and effectual mode of treatment. He can discern no ground whatever for proposing castration in this malady, since in no part of its progress, nor in any of its possible consequences and effects, can it expose the patient to the slightest risk.

Mr. Lawrence also mentions the possibility of there being other kinds of fungi, which may be met with, growing from the testicle, and quotes an instance, in which Dr. Macartney found a fungus, of a firm and dense structure, growing from the tunica albuginea, while all the substance of the testicle itself was sound. Dr. Macartney was so kind as to show me the preparation, affording a clear specimen of the second kind of fungus. The cases drawn up by Mr. Lawrence are, in my opinion, highly interesting, and may be read in the *Edinb. Med. and Surg. Journal, for July*, 1808.

I have already noticed, that Callisen represents the lipoma, as sometimes originating from the surface of the tunica vaginalis, a kind of case which has not yet fallen under my observation.

In the preface to the last edition of this Dictionary, p. 10, I quoted a case, published by Dr. H. Weinhold, in which the operation for bubonocele was performed, and as the testicle was diseased, the surgeon made a complete division of the spermatic chord, tied the spermatic arteries, and then left the testicle in its natural situation. After a time, the absorbents had diminished the part to a very inconsiderable little tumour. (See *Journ. der Pract. Heilkunde von C. W. Hufeland and K. Himly*, 1812, *Zehntes, Stück, p.* 112.) This case merits attention, and ought to have been cited in the article *Castration*, because it is the first instance, I believe, in which such practice was tried. Subsequently, the following work has been published, though I have not yet met with it. "*Nouvelle Methode de traiter le Sarcocele, sans avoir recours à l'extirpation du Testicule, par C. Th. Maunoir, 8vo. Geneve*, 1820. The new plan consists in dividing and tying the spermatic arteries, and leaving the rest of the chord and the testis undisturbed.

TETANUS. (from τείνω, to stretch.) Tetanus is defined by all authors to be a more or less violent, and extensive contraction of the muscles of voluntary motion, attended with tension and rigidity of the parts affected.

The excessive contraction of the muscles is kept up without any intervals of complete relaxation, in which respect the disorder differs from ordinary spasms and convulsions, where the contractions and relaxations alternate in rapid succession. In tetanus, the powers of sensation and intellect also remain unimpaired, in which particularity it forms a contrast to epilepsy. (*Rees's Cyclopædia, art. Tetanus.*)

When its effects are confined to the muscles of the jaw or throat, it is called *trismus*, or *locked jaw*; when all the body is affected and becomes rigid, but retains its ordinary straightness, the case is named *tetanus*. When the body is bent forwards, the disease is termed *emprosthotonos*: and *opisthotonos*, when the muscles of the back are principally affected.

To these four forms, some writers have added a fifth, which they denominate *pleurosthotonos*, and which is characterized by the body being drawn to one side. It is the *tetanus lateralis* of Sauvages.

The different terms which are applied to tetanic affections, do not imply so many particular diseases; but only the seat and various degrees of one and the same complaint.

A far more important division of tetanus, is into the *acute* and *chronic*, according to its greater or lesser intensity. The first is exceedingly dangerous, and usually fatal; while the latter, on account of the more gradual progress of the symptoms, affords more opportunity of being successfully treated. (*Larrey, in Mém. de Chirurgie Militaire, T. 1, p.* 235, 236.)

Tetanus may also be distinguished into the *traumatic*, or that arising from wounds, being the case with which surgeons have principally to deal; and into the *idiopathic*, or that proceeding from a variety of other causes.

Traumatic tetanus sometimes comes on in a surprisingly sudden manner, and quickly attains its most violent degree. The most rapidly fatal case that has ever been recorded, is one that we have on the authority of the late Professor Robison of Edinburgh. It occurred in a negro, who scratched his thumb with a broken china plate, and died of tetanus a quarter of an hour after this slight injury. (See *Rees's Cyclopædia, art. Tetanus.*) But commonly, the approaches of the disorder are more gradual, and it slowly advances to its worst stage. In this sort of case, the commencement of the disorder is announced by a sensation of stiffness about the neck, a symptom, which increasing by degrees, renders the motion of the head difficult and painful. In proportion as the rigidity of the neck becomes greater, the patient experiences about the root of the tongue, an uneasiness which soon changes into a difficulty of mastication and swallowing, which after a time became totally impossible. The attempt at deglutition is attended with convulsive efforts, especially when an endeavour is made to swallow liquids; and so great is the distress which accompanies these convulsions, that the patient becomes very reluctant to renew the trials, and refuses all nourishment. Sometimes it even inspires him with a dread of the sight of water, and a great resemblance to hydrophobia is produced.

One of the next remarkable symptoms is a very severe pain at the bottom of the sternum, darting from this point backward to the spine, in the direction of the diaphragm. As soon as this pain commences, the spasms of all the muscles about the neck become exceedingly violent, and the head is drawn backwards or forwards, according as the contraction of the extensor or flexor muscles happens to be strongest; but in the majority of cases, the head and trunk are curved backwards, (*Boyer, Traité des Mal. Chir. T.* 1, *p.* 288.) and the contractions increasing in force, the body is frequently raised in the form of a bow, resting upon the head and feet alone; a state which is more particularly denominated *opisthotonos*. (*Rees's Cyclopædia, art. Tetanus.*) At the same time, the muscles which close the lower jaw, and which were affected with spasm and rigidity in the very beginning of the disorder, now contract with great power, so as to maintain the lower jaw-bone inseparably applied to the upper one. The last state, which has been considered as a particular affection under the name of *trismus* or the *locked-jaw*, Boyer conceives may be regarded as the pathognomonic symptom of tetanus, which in many instances is limited to such an affection of the jaw.

The muscles affected in tetanic cases are never altogether relaxed, as long as the disease continues; but still they become more violently contracted in the frequent paroxysms of spasm, which always attend the complaint, and increase as it advances.

The continuance of the disease is marked by the increasing spasm of the diaphragm, which now returns every ten or fifteen minutes, and is instantly succeeded by a stronger retraction of the head and rigidity of the muscles of the back, and even of those of the lower extremities. The abdominal muscles are also strongly contracted, so that the belly feels as hard and tense as a board. By the violence of the contractions, indeed, the recti muscles have been known to be lacerated, as I shall relate an example of hereafter. Sometimes the spasm and tension extend only to the muscles on one particular side of the body: the *tetanus lateralis* of Sauvages, and the *pleurosthotonos* of other nosologists.

When the disease reaches its most violent stage, the flexor muscles of the head and trunk contract so powerfully, that they counterbalance the force of the extensors, and hold those parts in a straight, fixed, immoveable position. This is the condition to which the appellation of *tetanus* more particularly belongs. The muscles of the lower extremities become rigid; and even the arms, which till now were little affected, also partake of the general spasm and stiffness, with the exception of the fingers, which often retain their moveableness to the last. The tongue likewise continues a long while endued with the power of voluntary motion; but, at length, the violent spasms do not leave it unaffected, and it is then liable to be forcibly propelled between the teeth, where it is sometimes dreadfully lacerated.

In the extreme period of the disorder, all the muscles, destined for voluntary motion, are affected; among others, those of the face; the forehead is drawn up into furrows; the eyes, sometimes distorted, are generally fixed and motionless in their sockets; the nose is drawn up, and the cheeks are retracted towards the ears; so that the features undergo a most extraordinary change When tetanus arrives at this stage, and the spasms are universal, a violent convulsion usually puts an end to the patient's misery.

Wherever the muscular contractions are situated in cases of tetanus, they are always accompanied with the most excruciating pain. They sometimes last, without any manifest remission, to the end of the disorder; but in almost all cases, their violence, and the sufferings excited by them, undergo periodical diminutions every minute or two. The relaxation, however, is never such as to let the muscles, which experience it, yield to the action of their antagonists; and it is in nearly all cases followed, in ten or twelve minutes, by a renewal of the previous contractions and suffering. The recurrence of these aggravated spasms frequently happens, without any evident cause; but it is often determined by efforts which the patient makes to change his posture, swallow, speak, &c.

As Dr. Cullen observes, the attacks of this disease are seldom attended with any fever. When the spasms are general and violent, the pulse is contracted, hurried, and irregular, and the respiration is affected in like manner; but during the remission, both the pulse and respiration usually return to their natural state. The heat of the body is commonly not increased; frequently the face is pale, with a cold sweat upon it; and very often the extremities are cold, with a cold sweat over the whole body. When, however, the spasms are frequent and violent, the pulse is sometimes more full and frequent, than natural; the face is flushed, and a warm sweat is forced out over the whole body.

"Although fever be not a constant attendant of this disease, especially when arising from a lesion of nerves; yet in those cases proceeding from cold, a fever sometimes has supervened, and is said to have been attended with inflammatory symptoms. Blood has often been drawn in this disease, but it never exhibits any inflammatory crust; and all accounts seem to agree, that the blood drawn seems to be of a looser texture than ordinary, and that it does not coagulate in the usual manner.

"In this disease the head is seldom affected with delirium, or even confusion of thought, till the last stage of it; when by the repeated shocks of a violent distemper, every function of the system is greatly disordered.

"It is no less extraordinary, that in this violent disease the natural functions are not either immediately or considerably affected. Vomitings sometimes appear early in the disease, but commonly they are not continued; and it is usual enough for the appetite of hunger to remain through the whole course of the disease; and what food happens to be taken down seems to be regularly enough digested. The excretions are sometimes affected, but not always. The urine is sometimes suppressed, or is voided with difficulty and pain. The belly is costive; but as we have hardly any accounts, excepting of those cases in which opiates have been largely employed, it is uncertain whether the costiveness has been the effect of the opiates or of the disease. In several instances of this disease a miliary eruption has appeared upon the skin, but whether this be a symptom of the disease, or the effect of a certain treatment of it, is undetermined. In the mean while, it has not been observed to denote either safety or danger, or to have any effect in changing the course of the distemper."—(*First Lines of the Practice of Physic, Vol.* 3.)

According to Baron Larrey, the opisthotonos is not so often observed in Egypt as the emprosthotonos, and the experience of this gentleman taught him that the former was the most rapidly fatal. We must not adopt, however, his curious opinion, that the violent extension of the vertebræ of the neck, and the manner in which the head is thrown back, cause strong compression of the spinal marrow, and a permanent contraction of the larynx and pharynx, (*Mém. de Chirurgie Militaire, T.* 1, *p.* 240.) since this sort of compression, if it did not at once destroy the patient, would at any rate paralize most of the muscles, and instantly stop their extraordinary contraction.

This experienced writer notices how much the nerves of the neck and throat seem generally to be affected on the invasion of this disease. The consequent contraction of the muscles of these parts, he says, is soon attended with difficulty of deglutition and respiration. The patients then experience, if not a dread of liquids, at least a great aversion to them, which often prevents the administration of internal remedies; and if the wound is out of reach of the interference of art, the patient is doomed to undergo the train of sufferings attendant on this cruel and terrible disorder. Nothing can surmount the obstacles which present themselves in the œsophagus. The introduction of an elastic gum-catheter into this canal, through the nostrils, is followed by convulsions and suffocation. "I have tried this means (says Larrey) on the person of M. Navailh, a surgeon of the second class, who died of a locked-jaw, brought on by a wound of the face, accompanied with a comminuted fracture of the bones of the nose, and part of the left orbit.

"In the examination of the bodies of persons dead of tetanus, I have found the pharynx and œsophagus much contracted, and their internal membrane red, inflamed, and covered with a viscid reddish mucus.

"Hydrophobia, hysteria, and several other nervous diseases, likewise produce their chief effects upon these organs, and the result appears to be the same. So, I have just remarked, when tetanus is arrived at its worst degree, the patients have a great aversion to liquids, and if they are forced to swallow them, immediate convulsions are excited. This circumstance was particularly observed in M. Navailh."—(*Mém. de Chirurgie Militaire, T.* 1, *p.* 247, 248.)

Sometimes tetanic affections deviate from their ordinary course and nature. The most singular of these anomalies is recorded by Sir Gilbert Blane; it is a case in which tetanus prevailed to a very considerable extent, without any degree of pain. The spasms were accompanied with a tingling sensation, which was even rather agreeable than distressing. The case, however, terminated fatally; but, to the last, no pain was experienced. In two examples, mentioned by the same author, the spasms affected only the side of the body in which the wound was situated.

The dissection of patients who have died of tetanus, has thrown no light upon the nature of this fatal disorder. Sometimes slight effusions are found within the cranium; but, in general, no morbid appearance whatever can be detected in the head. There is always more or less of an inflammatory appearance in the œsophagus and in the villous coat of the stomach about the cardia. But those who are conversant with dissections must be well aware, that these appearances are common to a great number of diseases, and are uniformly met with in every case of rapid or violent death. Besides the redness and increased vascularity of these parts, Baron Larrey, as I have already stated, found the pharynx and œsophagus much contracted, and covered with a viscid reddish mucus. He also found numerous lumbrici in the bowels of the several patients who died.—(See *Mém. de Chir. Militaire, T.* 3, *p.* 287.) This, however, could only be an accidental complication, and not a cause. In several cases, Dr. M'Arthur found the intestines much inflamed, and in two of them a yellow, waxy fluid, of a peculiar offensive smell, covered their internal surface; but whether the inflammation was primary, or only a consequence of the pressure of the abdominal muscles, which contract so violently in this disease, he is unable to decide.—(See *Med. Chir. Trans. Vol.* 7, *p.* 475, *and Rees's Cyclopædia, art. Tetanus.*)

Dr. Lionel Chalmers, of Charleston, South-Carolina, states, that when the disease forms very quickly, and invades the unfortunate persons with the whole train of its mischievous symptoms, in a few hours, the danger is proportioned to the rapidity of the attack, and that the patients thus seized, generally die in 24, 36, or 48 hours, and very rarely survive the third day. But when the disease is less acute, few are lost after the ninth or eleventh. (See *Med. Obs. and Inq. Vol.* 1, *p.* 92, 93.)

From the valuable report of Sir James Macgrigor, it appears, that several hundreds of cases of tetanus occurred in our army, during the late campaigns in Spain and Portugal. The disease was observed to come on at uncertain periods after the receipt of the local injury; but it terminated on the second, third, and fourth days, and even as late as the seventeenth and twentieth day; though it was usually not protracted beyond the eighth. (*Med. Chir. Trans. Vol.* 6, *p.* 353.)—I had a patient, however, who lingered in the military hospital at Oudenbosch five weeks, with chronic tetanus, before he died. This happened in the year 1814, soon after the assault on Bergen-op-Zoom, where the patient had been wounded, and suffered amputation of the thigh.

Although tetanus is a disease which has been observed in almost all parts of the world, experience proves that its frequency is much the greatest in warm climates, and especially in the hot seasons of those climates. It is also more common in marshy situations, and countries bordering upon the sea, than in places which are very dry, elevated, and at a distance from the sea-coast. Every class of individuals is exposed to its attacks; but infants, a few days after their birth, and middle-aged persons, are said to be oftener affected than older subjects, or others in the youthful period of life. The male sex more frequently suffer than the female; and the robust and vigorous more frequently than the weaker.

According to Dr. Cullen and other medical writers, the causes of tetanus are cold and moisture applied to the body while it is very warm, and especially the sudden vicissitudes of heat and cold. Or the disease is produced by punctures, lacerations, or other injuries. Cullen admits, however, that there are probably some other causes, which are not distinctly known.

Baron Larrey observed, that gunshot wounds in the course of the nerves, and injuries of the joints, often produced tetanus in the climate of Egypt, particularly when the weather, or temperature, passed from one extreme to the other, in damp situations, and in those which were adjacent to the Nile, or the sea. What he terms dry and irritable temperaments, were the most subject to the disorder, the event of which was found to be almost always fatal. (*Larrey, Op. et Loc. cit.*)

Traumatic tetanus is remarked to proceed oftener from wounds of the extremities, than from similar injuries of the trunk, head, and neck. Sometimes it originates at the moment of the accident, as in the instance mentioned by the late Professor Robison of Edinburgh; but in general, it does not come on till several days afterward, sometimes not till the wound is nearly or perfectly healed, and free from all pain and uneasiness. Wounds of every description may give rise to tetanus, and in warm climates, very trivial injuries produce it. Thus, in Egypt, Larrey had one case which proceeded from the lodgment of a small piece of fish-bone in one of the sinuses of the fauces. (*Mém. de Chirurgie Militaire, T.* 1, *p.* 254.) There can be no doubt, however, that in colder regions, traumatic tetanus seldom happens except from contused, punctured, or lacerated wounds; or wounds of the ginglimoid joints, with laceration of the tendons and ligaments; compound fractures, or dislocations; deep pricks in the sole of the foot; and especially lacerations of the fingers and toes. A partial division of a nerve has been suspected as a cause; but as some nerves must be imperfectly cut through in almost every wound, and yet tetanus does not arise, the reality of this cause is doubtful. Besides, if it were true, the cure would be easily effected by making the division of the nerve complete, which experience contradicts. Baron Larrey, however, has recorded a fact, which favours the opinion, as I shall presently notice. The inclusion of the nerves in the ligatures applied to arteries is another alleged cause of tetanus; but as this fault is very common, and tetanus rather rare in this country, while it may follow all sorts of wounds, whether accidents or operations, the accuracy of this opinion may also be doubted. In support of it, however, there are some cases and observations adduced by Larrey, which will be quoted in the sequel of this article. (See *T.* 3, of his *Mem. de Chir. Mil.*) I do not mean to hint, however, that the nerves are not sometimes tied in tetanic cases, or that the practice is not on every account blameable. Amputation and castration are the only great surgical operations to which I have seen tetanus succeed; though it may follow the employment of the knife on less severe occasions.

In warm countries, tetanus is an ordinary consequence of all kinds of wounds.

There cannot be a doubt, that difference of climate makes considerable difference in the degree and danger of tetanus. Larrey found, that in Egypt the disease was more intense, and bore a greater resemblance to hydrophobia, than in the colder climate of Germany. In both these countries, he remarked, that when the wounds causing tetanus, injured nerves situated on the forepart of the body, emprosthotonos was occasioned; that if the posterior nerves were hurt, opisthotonos followed; and that when the wound extended quite through a limb, so as to injure equally both descriptions of nerves, complete tetanus ensued. He noticed, also, that the disease commonly arose from wounds, when the seasons and temperature passed from one extreme to another. Exposure to the cold damp nocturnal air, he found particularly conducive to it. (See *Mém. de Chirurgie Militaire, T.* 3 *p.* 286.)

In the late campaigns of our armies in Spain and Portugal, according to the report of Sir James Macgrigor, tetanus occurred in every description, and in every stage of wounds, from the slightest to the most formidable: it followed the healthy and the sloughing; the incised and the lacerated; the most simple, and the most complicated. It occurred at uncertain periods; but it was remarked, that if it did not commence before 22 days from the date of the wound, the patient was safe. (See *Med. Chir. Trans. Vol* 6, *p.* 453.) In Egypt, as we learn from Larrey, the latest period of the commencement of tetanus after a wound, was from the fifth to the fifteenth day. (*Mém. de Chir. Militaire, T.* 1, *p.* 263.)

It is observed by Dr. Dickson, that as the acute form of tetanus is so uniformly fatal, it is of the greatest consequence to attend to whatever may assist in detecting the disease early, or in warding it off. Richerand states, that in wounds threatening convulsions and tetanus, a persevering extension of the limbs during sleep often manifests itself, before any affection of the lower jaw; and we should naturally pay more attention to any admonition of this kind in punctured, or extensive lacerated wounds: particularly of tendinous, or ligamentous parts, and especially in injuries of the feet, hands knee-joint, back, &c. Some prelusive indications of danger may often be derived from the increase of pain, irritation, restlesness, nervous twitchings, pain and difficulty in deglution, or in turning the head; spasms, or partial rigidity of some of the voluntary muscles; pain at the scrobiculus cordis; a suppressed, or vitiated state of the discharge, &c. which mark the slower approaches of the disease. Larrey adduces several instances of tetanus, in which the wound was either dry, or afforded only a scanty serous exudation, and where the symptoms were relieved on suppuration being re-established; and Dr. Reid, in the Edinburgh Medical and Surgical Journal for July 1815, remarks, that on removing the dressing, the wound was covered with a darkish unhealthy-looking matter, and that he had seen this change the forerunner of tetanus in two other instances. A torpor of the intestines has generally been observed to precede, as well as accompany the disease, and Boyer, in particular, enumerates an obstinate constipation among the predisposing causes. (*Traité des Mal. Chir. T.* 1, *p.* 287.) Mr. Abernethy also informs us, that in four cases where he inquired into the state of the bowels, the evacuations were not like feces; and he proposes as a question, in investigating the cause, what is the state of the bowels between the infliction of the injury, and the appearance of this dreadful malady? (*Abernethy's Surgical Works, Vol.* 1, *p.* 104.) Dr. Parry thinks the velocity of the circulation an useful criterion of the danger of the disease, and observes, that if the pulse be not above 100, or 110, by the fourth or fifth day, the patient almost always recovers; but that if it be quickened early, the disease mostly proves fatal, and yet there are a few instances of recovery, where the pulse has risen to 120 on the first day. Baron Larrey remarks, that when the perspiration, which so often attends the disease is symptomatic, it begins upon the head and extremities; but that when it is critical, it occurs over the chest and the abdomen. (*Mémoires de Chir. Militaire, T.* 1, *p.* 256.) It must be confessed, however, that in many cases, perspiration flows very freely, without bringing relief. (*Rees's Cyclopædia, art. Tetanus.*)

I next proceed to consider the treatment of tetanus a subject of infinite difficulty, because the disease frequently baffles every mode of practice, and in certain instances, get well under the employment of the very same remedies, which decidedly fail in other similar cases of the disorder. Every plan has occasionally succeeded, and every plan has still more frequently miscarried. The great difficulty, therefore, is to ascertain, among numerous discordant accounts, what practice is found on the whole to be attended with the least ill-success? For, in the present state of our knowledge, the most credulous practitioner will not flatter himself with the supposition, that any effectual remedy for tetanus has yet been discovered. As, however, tetanus was regarded by Hippocrates and the ancients as certainly mortal, and it does not always prove so in modern times, it seems allowable to conclude that the recoveries, which now happen, must be ascribed to improvements in practice. This reflection should lead us not to give up the subject as hopeless; but to redouble our exertions for the discovery of a more successful method of treatment, and if possible, of some new medicine, possessing more specific power over the disorder.

As it is justly observed by a well-informed writer, when we reflect upon the obscurity which involves both the *ratio symptomatum*, and the proximate cause of tetanic affections, we need not wonder, that the practice in these disorders should still be entirely empirical. The indication of cure, which is generally applicable in all diseases, namely, the removal of the exciting causes, has but little place in a morbid condition, which is the consequence of causes, that in general have ceased to act, or which it is not in our power either to remove or control. In those cases, where we could suppose local irritation to be still operating, the most effectual method of counteracting its effects on the system, would obviously be to intercept all communication between the seat of the irritation and the sensorium. If, however, the disease has already established itself, and the severe symptoms have come on, it does not appear that this would succeed in arresting the course of the disorder. Experience has but too fully shown, that the amputation of the limb, from the injury of which the tetanus has arisen, will very seldom procure even a mitigation of the symptoms, if performed after a certain period from their first appearance. (*Rees's Cyclopædia, art. Tetanus.*) Baron Larrey has been the greatest modern advocate for the performance of amputation in cases where tetanus depends upon a wound of the extremities; but the facts which he has adduced in its favour are not numerous, and *he limits his recommendation of the measure chiefly to chronic cases*, and extends it to no others, except on the very first accession of the symptoms.

"The equally unexpected and entire success (observes Larrey,) obtained by the amputation of the injured limb, in the person of an officer attacked with *chronic* tetanus, leads me to propose the question, *whether, in this disorder, occasioned by a wound of some part of the extremities, it would not be better to amputate the injured limb immediately the symptoms of tetanus commence, rather than expect from the resources of nature, and from very uncertain remedies, a cure which so seldom happens?*

"If tetanus is chronic, as is sometimes observed, amputation may be done at every period of the disorder, provided a choice be made of the time when there is an intermission of the symptoms. The operation would not answer so well in acute tetanus, if the disease were advanced, and the muscles to be divided were strongly contracted and rigid, as I have observed at the siege of Acre in a soldier, who was seized with tetanus in consequence of a gunshot wound of the left elbow." (*Mém. de Chir. Militaire, T.* 1, *p.* 262.)

Larrey did, indeed, try amputation in a few instances of acute tetanus. In the case last cited, the symptoms were already considerably advanced, when the experiment of amputating the arm was made; yet, says Larrey, the operation was followed by considerable ease. The symptoms recurred, however, a few hours afterward, and proved fatal on the third day. In another example, this gentleman repeated the experiment, though acute tetanus had begun. The operation is described as having stopped all the symptoms, as it were, by enchantment; the patient even passed twelve hours in perfect ease; but being exposed to the damp cold air, the disorder returned, and carried him off. (See *Mém. de Chirurgie Militaire, T.* 1, *p.* 263—269.) The Baron also records some cases in favour of amputation at the commencement of tetanus from wounds, and especially for the relief of the disease in the chronic form. He has likewise adduced an interesting example, in which speedy relief and a cure followed cutting off all communication between the nerves of the wounded part and the sensorium by a suitable incision.

In this place I think it right to remind the reader, that although Baron Larrey once or twice amputated when acute tetanus was somewhat advanced, he does not advise the practice, and he expressly restricts his sanction of amputation to chronic or quite incipient cases of tetanus, and to a few instances in which the ginglimoid joints are fractured, accidents, which, independently of tetanus, would generally require the operation. (See *Mém. de Chir. Mil. T.* 3.) The report of Sir James Macgrigor fully confirms the statement of Larrey; namely, that free incisions are of little avail in the acute and fully formed disease, and that amputation fails in the same kind of case. After the battle of Toulouse, this operation was extensively tried; but without success. The French are also said to have lost an immense number of soldiers from tetanus after the battle of Dresden, when Sir James infers that the practice of amputation must have been fairly tried. (See *Medico-Chirurgical Trans. Vol.* 6, *p.* 456.) We have seen, however, that according to the precepts of Larrey, the French surgeons would only have performed the operation in chronic cases, which are not the most frequent, or if in other instances, only on the very first accession of the symptoms. But upon the whole, notwithstanding the partial degree of success attending Larrey's experiments, I have no hesitation in declaring my belief, that amputation of the injured part in cases of chronic tetanus will never be extensively adopted. The uncertain efficacy of this severe measure, and the occasional possibility of curing this form of the complaint by milder plans, will for ever constitute insuperable arguments against the practice.

Since the last edition of this Dictionary was printed, Sir Astley Cooper has published his sentiments respecting the plan of amputating in cases of tetanus, and they tend to confirm the opinion which I have always given upon the subject. In one case of tetanus, from a compound fracture just above the ankle, the operation seemed to precipitate the fatal event. In another case, the finger was amputated without any good; and a third case is referred to, in which the operation also failed in saving the patient's life. In chronic tetanus, amputation is regarded by Sir A. Cooper as unjustifiable, as the patient often recovers without this proceeding. The medicine which has appeared to this gentleman most useful in such cases, is the submuriate of mercury, joined with opium. (*Surgical Essays, Part* 2, *p.* 190.)

On the subject of making incisions for the purpose of separating the nerves of the wounded part from the sensorium, Larrey states, that they should be practised before inflammation has come on; for if this has made progress, they would be useless, and even dangerous. They should comprehend, as much as possible, all the nervous filaments and membranous parts; but he condemns all incisions into joints, as exasperating the symptoms of tetanus, instances of which he has witnessed. The Baron has recorded some convincing proofs of the benefit sometimes arising from completely dividing the trunk of the injured nerve. In one instance, tetanic symptoms followed an injury of the supraorbitary nerve, but were immediately stopped by dividing some of the fibres of the occipito-frontalis, and the nerves and vessels, down to the bone.

On the principle of destroying the parts, which are the seat of the local irritation, Baron Larrey also frequently applied the actual and potential cautery to the wound. The application of caustics, says he, may be practised with advantage on the first attack of the symptoms, the same precept being observed as in making the incisions. Bleeding, if necessary, and the use of topical emollients and anodynes, may follow these operations; though in general they have little effect. (*Mém. de Chir. Militaire, T.* 1, *p.* 249.) In the third volume of this interesting work, p. 297, &c. are several cases, in which the cautery was employed with success. We must not conclude, however, that much dependence ought to be placed in the use of the cautery, since Larrey observes in another place: "The moxa and actual cautery recommended by the Father of Medicine, have been equally unavailing. The moxa was employed at Jaffa upon three wounded men; the disease notwithstanding followed its usual course, and terminated fatally.

"I have cited a striking instance of the inefficacy of the second method, in a case of opisthotonos." (*T.* 1, *p.* 258.) This author also adduces some cases which tend to support the opinion, that tetanus occasionally proceeds from the inclusion of a large nerve in the ligature applied to an artery. The son of General Darmagnac died of tetanus consequent to amputation, and upon examining the stump, the median nerve was found included in the ligature with the artery, and its extremity reddish and swollen, (*Mém. de Chir. Mil. T.* 3, *p.* 287.) In another case, Larrey suspected the tetanic disorder to proceed from a principal branch of the crural nerve being tied together with the femoral artery, and he cut the ligature; but the relief was only partial and temporary. The cautery was therefore applied deeply to the whole surface of the stump. A marked amendment took place a few hours afterward, and the patient recovered. A diaphoretic mixture, with camphor and opium, was also exhibited. (*T.* 3, *p.* 297.)

Among other local means for the relief of tetanus, we might as well notice the employment of blisters as near as possible to the wound, or their application, or that of the ointment of cantharides, to the wound itself. Almost all modern writers have observed, that tetanus is accompanied at its commencement and in its progress with an interruption, or total cessation of suppuration in the wound. Hence the indication to excite this process again by the means which I have specified. Larrey seems to have adopted both plans; but he particularly applied the ointment of cantharides to the wound itself in an early stage of the symptoms, and in cases where there not only was a suppression of the discharge, but where he suspected the nerves of the wounded part had suffered from exposure to the cold damp air, on the detachment of the sloughs. For facts in favour of these local means, the reader must refer to the first and second volumes of the Memoires de Chirurgie Militaire.

It appears also from Larrey's experience in Egypt, that poultices made of the leaves of tobacco, and applied to the wounds of persons labouring under tetanus, are followed by no advantageous effect. The alkalies also proved of no service. (*Tom.* 1, *p.* 257.)

I shall conclude these remarks on what

may be called the local treatment of tetanus, with mentioning, that the celebrated Dr. Rush recommended the wound to be dilated and dressed with oil of turpentine. (See *Trans. of the American Philos. Society, Vol.* 2;) and that our naval surgeons often use tincture of opium as a dressing.

A great degree of obscurity prevails respecting the most eligible *general* or *constitutional* plans of treating tetanus, and I am afraid it must be confessed, that our internal remedies cannot be more depended upon, than the local means already described. This opinion is fully confirmed by adverting to the discouraging fact, recorded by Sir James Macgrigor, viz. that out of several hundreds of cases which occurred in the British army during the late campaigns in Spain and Portugal, there were very few which terminated successfully, or in which the remedies, however varied, seemed to have any beneficial influence after the disease had made any progress. (*Medico-Chir. Trans. Vol.* 6, *p.* 449.) The possibility of doing much good by internal medicines is also sometimes totally prevented by the inability of swallowing which afflicts the patient. In short, the present state of our knowledge respecting tetanus, will not allow us to indulge much hopes of cure from any means yet discovered, except in the chronic form of the complaint, the instances of success in the treatment of acute tetanus being by no means numerous.

Of all medicines, opium is that which has raised the greatest expectation, and been the most extensively tried in cases of tetanus. Indeed, there cannot be a doubt, that in many chronic, mild cases, it is competent to effect a cure. But for this purpose, it is absolutely necessary that its use be begun from the earliest appearance of the symptoms; that it be given in very large doses; and that the doses be repeated at short intervals, so that the system be kept constantly under the influence of the remedy. It is, indeed, astonishing how the system, when labouring under a tetanic disease, will resist the operation of this and other remedies, which, in its ordinary state, would have been more than sufficient to overpower and destroy it. Patients with tetanus will bear, with impunity, quantities of opium, which at any other time would have been certainly fatal. Instances are upon record of five, ten, and even twenty grains, being taken every two or three hours, for many days, without any extraordinary narcotic effects being produced upon the sensorium. It is always adviseable, however, to begin with comparatively moderate doses, such as forty or sixty drops of the tincture of opium, which may be repeated at intervals of three or four hours, and increased at each repetition, until some sensible effect is produced on the spasms. It seems requisite to augment the dose rapidly, as the disease presses upon us every hour, and no time must be lost while there is yet a chance of controlling its fury. The approaching closure of the jaw, and difficulty of deglutition, which may increase so as to render it hardly possible to introduce medicines into the stomach, are additional motives for pushing our remedies before such obstacles arise. (*Rees's Cyclopædia, art. Tetanus.*) I once supposed it might be possible to overcome this impediment by introducing a flexible catheter down the œsophagus from one of the nostrils; but the attempt to do this always brings on a violent paroxysm of spasms, attended with such a sense of suffocation that it cannot be endured. The experience of my friend, the late Mr. Cruttwell, of Bath, and that of Baron Larrey, have fully proved, that no assistance can be derived in these circumstances from the use of any flexible tubes. (See *Mém. de Chir. Militaire, T.* 1, *p.* 247.) Sometimes, however, the obstacle to the administration of medicines, arising from the closure of the jaw, is prevented by loss of some of the incisor teeth, and, in a few instances, Baron Larrey adopted the plan of extracting two of them. This would be useless, however, when deglution is totally hindered, as happened in one instance recorded by the latter eminent surgeon. (*Op. cit. T.* 3, *p.* 301.) Glysters are the only resource, when the spasms of the fauces cannot be overcome. In this way, as much as a drachm of the extract of opium has been introduced into the bowels at one dose. Opiate frictions upon the jaws, throat, and other parts of the body, have been practised. Opiate plasters have also been applied to the masseter muscles, and behind the ears. This external use of opium, however, can only be regarded as a feeble, and probably useless method.

As the costiveness always produced by tetanus is rendered still more obstinate by opium, laxative medicines and glysters should constantly accompany its employment. The testimony of the army physicians, as we learn from the report of Sir James Macgrigor, is highly in favour of a rigid perseverance in the use of purgatives, given in adequate doses to produce daily a full effect. Dr. Forbes states, that a solution of sulphate of magnesia, in infusion of senna, was found to answer better than any other purgative; and it was daily given in a sufficient quantity to procure a copious evacuation, which was always dark-coloured and highly offensive; and to this practice he chiefly attributes, in one severe case, the removal of the disease. (*Medico-Chir. Trans. Vol.* 6, *p.* 452.)

A spasmodic rigidity of the muscles being the most prominent symptom of tetanus, it was natural for practitioners to try the efficacy of some other antispasmodic medicines besides opium, and those which have been principally the subject of experiment, are castoreum, æther, the conium maculatum, musk, camphor, and latterly the digitalis. In many cases, opium and camphor have been exhibited together. Indeed, Larrey asserts, that of all the medicines hitherto proposed by skilful practitioners, the extract of opium combined with camphor, and the nitrate of potassa, dissolved in a small quantity of the almond emulsion, and given in doses more or less strong, produces the most favourable effects, since patients, who have an aversion to other fluids, take with pleasure this mixture, the action of which must be promoted by bleeding, if necessary, and blisters, under the circumstances which have been specified. (See *Mém. de Chir. Militaire*, *T.* 1, *p.* 271.). In the same work several cases are detailed which were benefited by such treatment.

Although some practitioners have thought that they have seen good effects result from musk, yet the majority of practitioners, who have made trial of both this and camphor, in cases of tetanus, have found no reason to recommend these medicines. Possibly this may be owing, in some instances to sufficient doses not having been exhibited, or to the musk not being of a good quality. One hundred and fifty grains of musk, however, have been given in the space of twelve hours, to a young girl, thirteen years old, affected with an incipient tetanus; but no salutary effect on the disorder was produced. We learn also from Sir James Macgrigor, that æther, camphor, musk, and other antispasmodics, as likewise the alkalies, were tried by our military surgeons in Spain, and found unsuccessful. (*Medico-Chir. Trans. Vol.* 6, *p.* 458.)

From the same authority we find, that digitalis, in large doses, was tried in several cases in the peninsula; and that it, with several other medicines enumerated, failed in almost every case of acute tetanus which occurred. (*P.* 454.) In one case recorded, the jaw remained fixed to the last, and the patient was never entirely free from spasms. (*P.* 458.) I am not acquainted with any cases in which belladonna has been given; but it is certainly a remedy well worthy of trial.

Analogy has also led to the employment of the warm bath, as a plan which seemed to promise great benefit, by producing a relaxation of the contracted muscles. But, notwithstanding this means has appeared in a few instances, to occasion some little relief, particularly when the practitioner has been content with mere fomentations, it generally fails, and often has even done mischief. This may perhaps be, in some measure, ascribable to the disturbance and motion which the patient must necessarily undergo, in order to get into the bath; for it is very well known, that every exertion on the part of the patient is very apt to excite most violent paroxysms of spasm. The author of the article Tetanus, in the Encyclopédie Méthodique, mentions his having seen the warm bath do harm, in two or three cases in which it was expected to do good. Though numerous writers have recommended the trial of the plan, it would be difficult to trace, in their accounts, any facts which decidedly show that its adoption has ever been followed by unequivocal benefit. The warm bath was tried in Spain, and found to produce only momentary relief. (*Medico-Chir. Trans. Vol.* 6, *p.* 457.) Dr. Hillary, who practised a long while in the warm climate of America, where tetanus is very common, disapproves of this method of treatment. He observes, that although the use of the warm bath may appear to be very rational, and promise to be useful, he has always found it much less serviceable than emollient and antispasmodic fomentations; and he also mentions, that he has sometimes seen patients die the very moment when they came out of the bath, notwithstanding they had not been in it more than twenty minutes, the temperature of the water being likewise not higher than 29 or 30 of Reaumur's thermometer. (See *Hillary on the Air and Diseases of Barbadoes.*)

De Haen also relates a similar fact of a patient dying the instant he was taken out of the warm bath.

It was in all probability, the bad effects and inefficacy of the warm bath which induced practitioners to try what might be effected by the cold one. The advantages of the cold bath were first explained by Dr. Cochrane, in the Edinb. Medical Commentaries; and the plan has subsequently received the praises of Dr. Wright, the eminent Dr. Currie of Liverpool, and others. Of all the remedies, which have been employed in cases of tetanus, the cold bath seems to be that which has been attended with the greatest success. Dr. Wright has published, in the *Medical Observations and Inquiries*, *Vol.* 6, a paper, in which may be found a narrative of the first trials of this method, which were all successful. The plan is said to be at present preferred throughout the West Indies. The way adopted consists in plunging the patient in cold water, and in that of the sea, when at hand, in preference to any other, or else in throwing from a certain height several pails of cold water over his body. After this has been done, he is to be very carefully dried with a towel, and put to bed, where he should only be lightly covered with clothes, and take twenty or thirty drops of laudanum. The symptoms usually seem to give way, in a certain degree, but the relief which the patient experiences is not of long duration, and it is necessary to repeat the same measures at the end of three or four hours. They are to be repeated in this manner; that is to say, at such intervals, until those of freedom from the attacks of the disorder increase in length. This desirable event generally soon follows, and ends in a perfect cure. Wine and bark were sometimes conjoined with the foregoing means, and seemed to co-operate in the production of the good effects. Dr. Wright concludes the account with the following remark, sent to him with a case by Dr. Drummond of Jamaica:—"I am of opinion that opiates and the cold bath will answer every intention in the tetanus and such like diseases; for whilst the opium diminishes the irritability, and gives a truce from the violent symptoms, the cold bath produces that wonderful tonic effect so observable in this and some other cases. Perhaps the bark, joined with these, would render the cure more certain. May we not then have failed in many cases, by using opiates alone in large doses, or what probably is worse, with the warm bath, instead of the cold bath? And have we not reason to suspect that the increased doses of opium, that seemed requisite when the warm bath was used, may have proved pernicious?"—(*Vol.* 6, *p.* 161.)

Our army surgeons, who were in Spain, are said to have found the cold bath worse than useless, (*Medico-Chir. Trans. Vol.* 6, *p.* 254.) and here I beg to remark particularly, that the plan seems to present no hope of benefit in cases of tetanus from wounds, however strong the evidence is of its utility in other examples of the disease. This was the opinion of Dr. Cullen, and it is adopted by Callisen, who observes, "Immersio subita iterata totius corporis in aquam frigidam in tetano a causa interna mire prodest, in tetano a causa externa minorem effectum præstat." (*Systema Chirurgiæ Hodiernæ, Part.* 1, *p.* 169, 170, *Edit.* 1798.) On the subject of cold effusion and bathing, there are on record two cases, which are curious. One is related by Baron Larrey. It was an instance of tetanus from a gunshot wound. The cold bath was used. The two first trials gave the patient extreme pain, and no amendment followed. The sight of the bath the next time filled him with an invincible dread of the water, into which he refused to be put. He was covered, however, with a blanket, and immersed. The tetanic stiffness was immediately increased, and dreadful convulsions excited. It became necessary to remove him directly from the bath, and put him to bed. Deglutition was from the moment utterly impeded, and the contraction of the muscles carried to the most violent degree. A tumour, about as large as an egg, suddenly made its appearance near the linea alba, below the navel. After death, this was found to be caused by a rupture of one of the recti muscles, and a consequent extravasation of blood. (See *Mém. de Chirurgie Mil. T.* 3, *p.* 287—289.) This case is decidedly in support of the truth of what Professor Cullen and Callisen have observed. The next is not so: it is mentioned by Sir James Macgrigor, that, in the march of the guards through Gallicia, one of them was attacked with tetanus, in consequence of a slight wound of the finger. As it was impossible to think of leaving the man in the wretched village where he was taken ill, he was carried on a bullock car, in the rear of the battalion. During the first part of the day he was drenched with rain, the thermometer standing at 52°; but, after ascending one of the highest mountains in Gallicia, the patient was in a cold of 30°; and he was exposed from six in the morning till ten at night, when he was found half starved to death, but free from every symptom of tetanus. (See *Medico-Chir. Trans. Vol.* 6, *p.* 450.)

Another remedy, which is said to have frequently effected a cure in tetanus, is mercury. It has been employed in France with the greatest success, as may be seen by referring to the forty-fifth volume of *Journal de Medecine.* This remedy, however, should be resorted to, in an early period of the disorder. Mercurial frictions are preferred, and these are to be put in practice so as to bring on a quick affection of the mouth; care being taken, however, not to render the soreness and salivation too violent. Some contend, that it matters not, whether mercury be rubbed into the body, or given internally. It is generally allowed, that opium may be advantageously exhibited at the same time. This practice was first adopted in the West Indies, (see *Edinb. Physical and Literary Essays, Vol.* 3,) where it succeeded in many cases. Whatever benefit, however, may have been experienced from this plan in mild cases, it completely fails in the acute form of the disease. Mercurial frictions appeared to Baron Larrey to aggravate the symptoms, in the cases where the plan was tried in Egypt (*Mem. de Chir. Mil. T.* 1, *p.* 257;) and Dr. Emery, Mr. Guthrie, and other medical officers, attached to our army in the peninsula, tried inunction of the whole body, three times a day, with strong mercurial ointment, in unlimited quantity, with no degree of success. After the battle of Toulouse, a fatal case even occurred in a man strongly under the influence of mercury, which he had been previously using for the cure of the itch. (*Sir J. Macgrigor in Medico-Chir. Trans. Vol.* 6, *p.* 454.) The submuriate of mercury, combined with ipecacuanha, also proved inefficacious in acute cases; but, in chronic ones, the former medicine proves serviceable in keeping open the bowels.

Another method of treating tetanus is that of administering the most powerful tonics and stimulants, such as wine, brandy, æther, preparations of ammonia, bark, cordials, &c. The introduction of this plan was chiefly owing to the eminent Dr. Rush, Professor of Medicine in Philadelphia, who published in the Transactions of the American Philosophical Society, Vol. 2, a paper entitled "*Observations on the Cause and Cure of Tetanus.*" Dr. Rush considers tetanus as a disease essentially connected with debility, and he recommends for it the exhibition of the preceding class of remedies. He particularly advises the liberal use of wine and Peruvian bark; and, as we have already stated, when tetanus arises from a wound, he directs the dilatation of it, and dressings with oil of turpentine. Considerable success is represented as having attended the practice. Several other instances of success are also recorded by Dr. Hosack. (*American Medical Repository, Vol.* 3.)

Nothing is a more certain proof of our not being acquainted with any very effectual method of treating a disease, than a multiplicity of remedies, which are as opposite as possible in their effects. We have seen that the celebrated Dr. Rush conceived, that tetanus was a disease connected with debility, and he has recorded examples, in which it was successfully treated by tonics and stimulants. Extraordinary, however, as it may appear, many practitioners are advocates for venesection, especially in the early stage of tetanus. Dr. Dickson thinks, that in a full habit, where the wound is swelled, inflamed, and painful, venesection, with free purging, and such other means as are calculated to allay the general and local irritation, affords the fairest chance of averting the danger. (See *Medico-Chir. Trans. Vol.* 7, *Part* 2.) Larrey has also published several cases, in which bleeding had a good effect. We are informed by Sir James Macgrigor, that, in our military hospitals in Spain, venesection had a fair trial. In three cases at St. Andero, detailed by Mr. Guthrie, this was the principal remedy. One patient with tetanus, from a wound of the back part of the hand, was bled nearly *ad deliquium* several times with good effect, calomel and diaphoretics being also given, and he recovered. Another patient was bled in the same manner with such amendment, that he suffered but little from spasm, and could open his mouth very well, when he was seized with diarrhœa, which in his debilitated state, carried him off. In the third case, which was one of acute tetanus venesection, pushed to the utmost, totally failed. (*Op. cit. Vol.* 6, *p.* 455, 456.)

The powerfully relaxing effects of tobacco clysters, in cases of hernia and enteritis, have suggested a trial of them in tetanus. In one very acute case, the plan was tried by Mr. Earle, but it only afforded a temporary alleviation of the spasms, and, as it caused severe agitation, it was discontinued. According to Sir James Macgrigor, tobacco clysters, tried in the advanced stage of the disease, seemed to have no effect. He considers, however, the tobacco fume as deserving further trial.

A remarkable case is recorded by Dr. Phillips, in which the jaw suddenly fell upon the exhibition of an enema with oil of turpentine. (See *Medico-Chir. Trans. Vol.* 6, *p.* 65.)

According to Baron Larrey, frictions, with oily liniments, as recommended by some authors, were tried by the French surgeons at Cairo; but they produced no change in the state of the disease. We learn, from the same authority, that the application of blisters to the throat also failed in checking the symptoms.

The Barbadoes tar, mentioned by Cullen, electricity, the colchicum autumnale, or meadow saffron, recommended by Dufresnoy, and several other means formerly in repute for their virtues in cases of tetanus, have now been fully proved by experience to possess little or no claim to this character.

Consult *Hippocrates de Morbis Popularibus, Lib.* 5 *et* 7. *Cælius Aurelianus de Morbis acutis. Medical Observations and Inquiries, Vol.* 1, *p.* 1 *and* 87; *Vol.* 6, *p.* 143. *Hillary on the Air and Diseases of Barbadoes, Edin. Physical and Literary Essays, Vol.* 3. *Dr. Carter, in Medical Trans. Dr. Cochrane in Edin. Medical Commentaries. Cullen's First Lines of the Practice of Physic, Vol.* 3. *Rush's Observations on the Cause and Cure of Tetanus, in Vol.* 2 *of the Transactions of the American Philosophical Society. Sir Gilbert Blane's Observations on the Diseases of Seamen, Edit.* 3. *M. Ward, Facts establishing the Efficacy of the Opiate Friction in Spasmodic and Febrile Diseases, &c.* 8*vo. Manchester,* 1809. *Larrey, Mémoires de Chir. Militaire, T.* 1, *p.* 235, *&c.*; *T.* 3, *p.* 236, *&c. Callisen, Systema Chirurgiæ Hodiernæ, Pars* 1, *p.* 165, *&c. Sir James Macgrigor, in Med. Chir. Trans. Vol.* 6, *p.* 449, *&c. Dr. Phillips's Case in the same work and volume, p.* 65. *Dr. Dickson's Observations on Tetanus, and Dr. Macarthur's Letter in Vol.* 7, *p.* 448, *&c. of the same book. Trnka de Krzowitz, de Tetano Commentarius, Vindob.* 1777. *Richerand, Nosogr. Chir. T.* 2, *p.* 338, *&c. Edit.* 4. *Edinb. Med. and Surgical Journal, Vol.* 1, *p.* 67; *Vol.* 2, *p.* 255—430; *Vol.* 4, *p.* 45, *&c. &c. Boyer, Traité des Mal. Chir. T.* 1, *p.* 285, *&c. Paris,* 1814. *Rees's Cyclopædia, art. Tetanus. C. H. Parry, Cases of Tetauns, and Rabies Contagiosa, &c.* 8*vo. Lond.* 1814. *John Morrison, a Treatise on Tetanus,* 8*vo. Newry,* 1816. *Robert Reid, on the Nature and Treatment of Tetanus and Hydrophobia,* 8*vo. Dublin,* 1817. *Stewart, in Med. Chir. Journ.*; *Oil of Turpentine tried. Sir Astley Cooper, Surgical Essays, Part* 2, *p.* 190. *Burmester, in Med. Chir. Trans. Vol.* 11.

THORAX, WOUNDS OF. See *Wounds of the Thorax.*

THROAT, WOUNDS OF. Injuries of this kind are often attended with considerable danger, on account of the great number of important parts, which are interested; but mere cuts of the integuments of the throat and neck are not (generally speaking) dangerous cases, and do not materially differ from common incised wounds of the skin in any other part of the body. They are not liable to be followed by any particular consequences, and require the same kind of treatment as cuts in general. (See *Wounds—Incised Wounds.*)

In wounds of the throat and neck, however, the larynx and trachea, pharynx and œsophagus, the trunk of the carotid artery, and all the principal branches of the external carotid, the large jugular vein, the eighth pair of nerves, and the recurrent nerve, are all exposed to injury; some much more so than others, but all of them being occasionally reached by the edge of the knife or razor, or the point of the sword, or other instruments.

It would be absurdity to offer an account of what is to be done in cases attended with some part of the mischief above pointed out; for no patient thus wounded would ever be found alive. Wounds of the eighth pair of nerves are generally considered fatal, though some doubts begin to be entertained on the point. Indeed, Klein positively states, that such an injury is not fatal. (See *Journ. der Chir. B.* 1, *p.* 123, 8*vo. Berlin,* 1820.) However, if such a wound is not absolutely fatal, there can be no doubt of its being highly perilous, and that it should be cautiously avoided. These nerves as is well known, proceed down the neck in the same sheath of cellular substance which includes the carotid artery, and lie on the outside of this vessel, between it and the internal jugular vein.

Wounds, either of the carotid artery or internal jugular vein, must generally prove immediately fatal, in consequence of the great and sudden loss of blood. However, were any surgeon on the spot at the moment, he should instantly secure the wounded vessel. In tying the carotid, one caution is highly necessary, viz. always to be sure that the par vagum is excluded from the ligature: for were this nerve to be tied, the mistake, if not absolutely mortal, would leave but a slight possibility of recovery.

If the mouth of the vessel could not be at once secured, pressure should be instantly resorted to, for the purpose of producing a temporary suppression of the hemorrhage. The surgeon should then either make the necessary enlargement of the wound in the integuments, with a due and constant recollection of the important parts near the place, or else, in the case of the carotid being injured, he should cut down to this vessel in the manner explained in the article *Aneurism.*

In lacerated wounds, the carotid artery may be injured, and yet the patient not immediately bleed to death; for it is the nature of all wounds, attended with much laceration and contusion, not to bleed so freely as clean cuts. Mr. Abernethy has related a case in which the carotid, and all the chief branches of it, were wounded in a man who was gored in the neck with a cow's horn; yet death did not directly follow, and there was time to have recourse to the ligature. Baron Larrey even reports one or two cases in which the bleeding from the carotid, injured by a gunshot, was permanently stopped by pressure. (See *Mém. de Chir. Milit.*) Dr. Hennen also refers to another instance of a similar nature. (*On Military Surgery, p.* 106, *Ed.* 2.)

Punctured wounds might obviously injure either the carotid, or the internal jugular vein, without the patient expiring of hemorrhage at once; because the smallness of the wound in the skin might hinder the fatal effusion of blood.

However, frequently, when these vessels are wounded, the par vagum is also injured, and the case is mortal, either immediately, from the direct effects both of the injury of the nerve, and sudden loss of blood, or very soon afterward, the bleeding being of a slower and more interrupted kind; which circumstance must depend on the lacerated nature of the wound, the small size of the opening in the vessel, or of that in the skin, &c.

Persons who attempt suicide, by cutting their throats, do not often divide the carotid artery, on account of their incision being made too high up. Where the carotid arteries emerge from the chest, they are situated by the side of the trachea, and even a little more forward than it. However, as these vessels proceed up the neck, they become more laterally situated with respect to the trachea; and when they have arrived at the upper part of the neck, where persons, who aim at suicide, almost always cut, they become situated more backward than the trachea, inclining towards the angle of the lower jaw.

The œsophagus is so deeply situated, lying close to the bodies of the vertebræ, and behind the trachea, that it is not often interested in any incised wounds, which do not immediately prove fatal, in consequence of the division of other important parts. Yet numerous cases are recorded, in which the œsophagus is said to have been wounded; and what is usually set down as a criterion of the fact, is the passage of victuals through the wound. In many of these narrations the writers seem to have forgotten, that wounds, made above the os hyoides, as they frequently are, may enter the mouth, and the victuals escape through the cut, without the œsophagus, or pharynx, being at all concerned.

However, no doubt, the œsophagus has occasionally been wounded, together with the trachea, not only without the patient perishing so immediately as to be incapable of receiving any succour, but without every chance of recovery being destroyed. Stabs, and gunshot wounds, may injure the œsophagus, and leave all other important parts untouched. Nay, when other parts of consequence are injured, the patient is sometimes saved. (See *Hennen's Military Surgery, p.* 363, *Ed.* 2.)

Even where the œsophagus is known to be wounded, its deep situation would prohibit us from doing any thing to the breach of continuity in the tube itself. The best plan would be to have recourse to antiphlogistic means, and to introduce a flexible elastic gum catheter from one of the nostrils down the œsophagus, for the purpose of conveying nourishment and medicines into the stomach, without any risk of their passing out at the wound. An instrument of this kind will lie in the above situation for any length of time without occasioning much inconvenience; and, besides being advantageous for injecting nourishment and medicines down the passage, and keeping them from issuing at the wound, it prevents all necessity for the wounded œsophagus to act and become disturbed, when there is occasion to take any kind of liquids, whether in the way of medicine or food. The outer wound should be brought together, and treated on common principles.

When persons cut their throats, as I have explained, they do not often divide the carotid artery, owing to their incision being usually made high up in the neck, where this vessel has attained a very backward situation. When any serious hemorrhage does arise, it is sometimes from the lower branches of the lingual artery, but most frequently from the superior thyroideal arteries. Such arteries may occasion a fatal bleeding, which, indeed, would more frequently be the event, than it actually is, did not the patient often faint, in which state the bleeding spontaneously ceases, and gives time for the arrival of surgical assistance.

I need hardly tell the reader, that these arteries are to be tied, and that this important object is the first to which the surgeon should direct his attention. The danger of bleeding to death being obviated, as soon as possible, the other requisite measures may be more deliberately executed.

With respect to wounds of the trachea, the same plan of conveying food and medicines into the stomach, through an elastic gum catheter, introduced from one of the nostrils down the œsophagus, is highly proper, though too much neglected. For nothing creates such disturbance of the wound as the convulsive elevation and depression of the larynx and trachea, which are naturally attendant on the act of swallowing.

When the trachea is cut, the patient's power of forming the voice is more or less impaired, in consequence of the air passing into and out of the lungs, chiefly through the wound. Besides air, a considerable quantity of the natural mucus of the trachea is also continually coming out of the wound.

The grand means of accomplishing the union of wounds of the trachea, are a proper position of the head, and a rigorous observance of quietude. By raising the patient's head with pillows, and keeping his chin close to his breast, the edges of the wound, both in the skin and trachea, are placed in contact even without any other assistance, unless the division of the trachea be exceedingly large. It is proper, however, to assist the effect of a suitable position with strips of sticking plaster, and sometimes with a suture or two. But the necessity for sutures must depend on the extent of the division of the trachea; for unless most of the circle of this tube be cut, and position be neglected, the wound in it will not gape. The stitches should never be passed through the lining of the trachea, as this method would be likely to make it inflame, and occasion considerable coughing and irritation, attended with very pernicious effects.

Should there be much coughing, apparently arising from irritation and inflammation in the trachea, bleeding is proper if other considerations do not forbid it. The spermaceti mixture, with opium, is also frequently of great service I never saw a wound of the trachea unite by the first intention. (See *John Bell on Wounds, Ed. 3. Hennen's Military Surgery, p. 356, &c. Ed. 2. 8vo. Edinb.* 1820. *Among other references made by Dr. Hennen, the following seem to me to merit particular notice :—An interesting case of wound of the neck, succeeded by hemiplegia, and another of gunshot wound of the throat, succeeded by paralysis and convulsions, says Dr. Hennen, is given by Forestus in his Surgical Observations. Another, with loss of motion in the arm, from a wound in the neck, is to be found in the Edinb. Med. Essays, Vol.* 1. *And in the Med. Commentaries, by Dr. Duncan, Vol.* 4, *p.* 434, *and Vol.* 8, *p.* 356, *are two interesting cases. Murinna, in his Med. Chir. Beobachtungen, relates a case of removal of the thyroid gland by a cannon ball; the patient survived fourteen days, and died of dysentery. Wounds of the œsophagus often remain open for indeterminate periods, as is exemplified in a case reported by Trioen, in his Fasciculus Observationum, Ludg.* 1745. *p.* 40. *Mr. Bruce has recorded an interesting case of wound of the Œsophagus, in Med. Chir. Journ. Vol.* 1, *p.* 369. *I would also refer to various parts of Mém de Chir. Milit.* 4 *Tomes, by Baron Larrey. And Thomson's Report of Obs. made in Mil. Hospitals in Belgium, 8vo. Edinb.* 1816.)

THROMBUS. (from θρομβος, coagulated blood.) A clot of blood. The term is also applied to a tumour, formed by a collection of extravasated, coagulated blood, under the integuments after bleeding. When such an extravasation is not considerable, it is usually called an *ecchymosis*. (See this word, and *Bleeding*.)

A thrombus after bleeding generally arises from the opening in the vein not corresponding to that in the skin. The patient's altering the posture of his arm, while the blood is flowing into the basin, will often cause an interruption to the escape of the fluid from the external orifice of the puncture; and consequently, it insinuates itself into the cellular substance in the vicinity of the opening in the vein. In proportion as the blood issues from the vessel, it is effused, in the cellular membrane, between the skin and fascia, covering the muscles, and this, with more or less rapidity, and in a greater or lesser quantity, according as the edges of the skin more or less impede the outward escape of the fluid. Sometimes, also, a thrombus forms after venesection, when the usual dressings, compress, and bandage, have been put over the puncture, and the patient imprudently makes use of the arm on which the operation has been done. This is more particularly liable to happen when the opening in the vein has been made large.

When the extravasation is not copious, it is of little importance, the tumour generally admits of being easily resolved, by applying linen, dipped in any discutient lotion. If the swelling be more extensive, applying to it a compress, wet with a solution of common sea-salt, is deemed an efficacious plan of promoting the absorption of the extravasated blood. Brandy, and a solution of the muriate of ammonia in vinegar, are likewise eligible applications.

It sometimes happens, that a thrombus induces inflammation and suppuration of the edges of the puncture. The treatment is now like that of any little abscess: a common linseed poultice may be applied, and any considerable accumulation of matter should be prevented by making an opening with a lancet in proper time. As soon as the inflammatory symptoms have ceased, discutients should be employed again, for the purpose of dispersing the remaining clots of blood, and surrounding induration.

When the quantity of blood is large, many authors recommend opening the tumour at once; and, despairing of the power of the absorbents to remove the extravasation, they recommended as much of the blood as possible to be pressed out through the incision. I believe, however, that making an opening is seldom necessary, and often brings on inflammation, and suppuration, when they might be avoided. I have never seen any case, in which there was real occasion to make an opening for the discharge of the blood. A case of this kind, however, may be conceived.

THYROID GLAND, DISEASED. (See *Bronchocele.*)

THYROID GLAND, EXTIRPATION OF. That such an operation, though attended with great difficulties, is not impracticable, is proved by the following example:—

On the 20th of March, 1791, a woman presented herself for admission at the Hôtel-Dieu, with a tumour of the right portion of the thyroid gland. The swelling was two inches in diameter, round, hard, and attached to the right and middle part of the trachea, and it pushed outwards the sterno-mastoideus muscle. Independently of its being sensibly raised by each pulsation of the arteries, it obeyed the motions of deglutition, and in a slight degree impeded the passage of solid aliment. The patient earnestly desiring to get rid of so inconvenient a deformity, determined to submit to its extirpation, which appeared the only resource. The danger, the length of time, and the pain necessarily annexed to the operation, were not concealed from her. Desault made a longitudinal incision through the middle of the tumour, beginning one inch above, and finishing one inch below the swelling. By the first stroke, he cut down as far as the gland, dividing the integuments, the platysma-myoides, and some fibres of the sterno-hyoidei and sterno-thyroidei muscles. An assistant, with the view of fixing the tumour, drew towards aside the inner edge of the wound, whilst the surgeon detached the swelling from the sterno-mastoideus muscle. In dissecting the cellular substance, which united the parts, two small arteries were divided, which were secured with ligatures. The outer portion of the tumour being thus disengaged, the inner was detached in the same way. The tumour was then drawn outwards by means of a hook, that it might be separated with more ease from the trachea. In the course of this dissection, the branches of the thyroid arteries were successively tied, as fast as they were divided. The assistant, who held the hook, pulled the gland from within and forwards, whilst the surgeon finished the dissection outwards and from above downwards. This part of the operation was the most difficult: it was necessary continually to wipe away the blood with a sponge, which necessarily prevented the parts from being easily distinguished, and obliged the surgeon to cut but a little at a time, and always to examine well with his finger those parts which he was about to cut. By this cautious dissection, the superior and inferior thyroid arteries were laid bare, and afterward tied with the aid of a blunt crooked needle. They were then transversely divided, and the remaining part of the tumour detached from the trachea, to which it strongly adhered. The wound resulting from this operation was near three inches in depth; it was outwardly bounded by the sterno-mastoideus muscle, and inwardly by the trachea and œsophagus; posteriorly by the carotid artery, and par vagum, which were exposed at the bottom of the wound. The extirpated tumour was five inches in circumference; and on examination was found to differ in no particular from scirrhous glands, except that in the centre there was a cartilaginous nucleus. The patient left the hospital perfectly well, the thirty-fourth day after the operation. (See *Desault's Parisian Chir. Journ. Vol.* 2, *p.* 292, 296.)

The extirpation of the thyroid gland is an operation extremely difficult, and certainly highly dangerous, when performed by an operator but moderately exercised in the practice of his profession. The number and size of the arteries divided, the proximity of the trachea, œsophagus, and carotid, near which the knife must necessarily pass, are the principal dangers. They have deterred the majority of practitioners from performing the operation, and it must be allowed, that they are such as ought to intimidate every man, who is not endued with anatomical knowledge, and the most undaunted coolness. Examples of this operation are very rare. The first time that Gooch undertook it, he was deterred from finishing it by the hemorrhage, and his patient died on the eighth day. The second time he succeeded better, but was incapable of securing the vessels, and succeeded in stopping the hemorrhage, which would otherwise have been mortal, by causing the parts to be compressed by the hand of an assistant for the space of eight days. (*Gooch's Med. and Chir. Obs. p.* 130. *Bell's System of Surgery, Vol.* 5, *p.* 525. *Richter's Bibl. T.* 2, *p.* 128.)

A. F. Vogel and Theden practised the operation with complete success. All danger from the hemorrhage, or inconvenience arising from the discharge of blood, may be obviated by taking up the small vessels, tying them as fast as they are divided, and by discovering and tying the large vessels previous to their division. Other parts that cannot be wounded without danger, are to be avoided by dissecting slowly and a little at a time, and feeling with the finger every part previously to its division with the bistoury.

A case, in which Klein removed a very large thyroid gland, has been recently published. The patient, a boy eleven years of age, died, however, on the operating table, as would seem from Klein's account, in consequence of apoplexy. (See *Journ. der Chir. B.* 1, *p.* 120, 8vo. *Berlin*, 1820; or *the Quarterly Journ. of Foreign Medicine, Vol.* 2, *p.* 380.) On the whole, I consider that the practice of tying the thyroidal arteries is generally a safer experiment than the removal of the enlarged gland with a knife. (See *Bronchocele.*)

*TIC DOULOUREUX. This term is used to signify a disorder, the most prominent character of which consists in severe attacks of pain, affecting the nerves of the face; most frequently the filaments of that branch of the fifth pair, which comes out of the infra-orbitary foramen; but sometimes the other branches of the fifth pair, and occasionally the numerous filaments of the portio dura of the auditory nerve, which are distributed upon the face. The complaint is not continual, but occurs in violent paroxysms, which vary in duration in different instances. It is the *trismus dolorificus* of Sauvage; the *Faciei Morbus Nervorum Crucians* of Dr. S. Fothergill; and of that order of diseases which Professor Chaussier has so aptly denominated *neuralgies* (from *νευρον*, a nerve, and *αλγος*, pain;) for it should be known, that many other parts of the body are subject to a similar affection.

The first excellent description of the tic douloureux was published in the year 1776, by the late Dr. Fothergill. (See *Med. Obs. and Inq. Vol.* 5.) It is not true, however, as is generally stated in modern medical works, that this gentleman was the first author who noticed the complaint. This indeed is so far from being correct, that we even find an account of an operation done long ago by Louis, for the relief of the disease, (See *No.* 36 *de la Gazette Salutaire*, 1766;) and this identical case actually became a subject of hot dispute between the physicians and surgeons of the French metropolis. (See a Thesis, entitled "*Utrùm in pertinacibus capitis et faciei doloribus aliquid prodesse possit, sectio ramorum nervi quinti paris? Proponebat Viellart*, 1768, *conclusio negativa.*"

Tic douloureux conveniently admits of being divided into four species, called by the French *frontal*, *suborbitary*, *and maxillary neuralgia*, and the *neuralgia of the facial nerve.*

In the frontal neuralgia, the pain usually begins in the situation of the supra-orbitary foramen, extending at first along the branches and ramifications of the frontal nerve distributed to the soft parts upon the cranium, and afterward shooting in the direction of the trunk of the nerve towards the bottom of the orbit. In a more advanced stage, the conjunctiva and all the surface of the eye participate in the effects of the disorder, and become affected with chronic inflammation, which is described as a particular species of ophthalmy. At length, the pain passes beyond the distribution of the branches of the frontal nerve, and affects all the corresponding side of the face and head. It seems as if it extended itself to the facial, sub-orbitary, maxillary, and even to the temporal and occipital nerves, through the communications naturally existing between the filaments of all those organs of sensation. Each paroxysm produces a spasmodic contraction of the eyelids, and a copious effusion of tears.

The sub-orbitary neuralgia is first felt about the sub-orbitary foramen. The seat is probably in the nerve of this name, and the pain extends to the lower eyelid, the inner canthus of the eye, the muscles about the zygoma, the buccinator, cheek in general, ala of the nose, and the upper lip. At a later period, the pain appears to extend backward to the trunk of the nerve, and those branches which are given off in its passage through the sub-orbitary canal. Hence, pains are then experienced in the upper teeth, the zygomatic fossa, the palate, tongue, and within the cavity of the nose. As the disorder advances, it may extend, like other neuralgiæ of the face, to all the same side of the head. During the paroxysms, when the disease is fully formed, an abundant salivation usually takes place. In general the attendant toothach deceives the practitioner, who in the belief that the pain arises from another cause, uselessly extracts several of the teeth.

The tic douloureux of the lower jaw, or maxillary neuralgia, is usually first felt about the situation of the anterior orifice of the canalis mentalis, and it extends to the lower lip, chin, neck, teeth, and temple. This form of the complaint is more uncommon than the preceding; but, after it has prevailed some time, is equally remarkable for its intensity.

With respect to the neuralgia of the facial nerve, or portio dura of the auditory nerve, it is a case, which very soon cannot easily be distinguished from the other species of tic douloureux. The pains at an early period are no longer confined to the passage of the principal branches of this nerve between the parotid gland and ramus of the jaw. The numerous communications of the portio dura with the rest of the nerves of the face seem to facilitate the extension of the disease, so that the agony is soon felt over the whole side of the head. The original source of the disorder can only be detected by attentively considering the progress of the complaint in all its stages. (See *Delpech, Traité des Maladies Reputées Chirurgicales, T.* 3, *Sect.* 7, *p.* 214, *&c.*)

Tic douloureux may be known from rheumatism by the paroxysm being excited by the slightest touch, by the shortness of its duration, and the extreme violence of the pain. In acute rheumatism, also, there is fever, with redness, heat, and generally some degree of swelling; and, in chronic rheumatism, the pain is obtuse, long-continued, and often increased at night; none of which symptoms characterize tic douloureux.

It may easily be distinguished from hemicrania by the pain exactly following the course of the branches of the affected nerve.

It is known from the toothach by the comparative shortness of the paroxysms; the quickness of their succession; the intervals of entire ease; the darting of the pain in the track of the particular nerve affected; the more superficial and lancinating kind of pain; and the convulsive twitchings, which sometimes accompany the complaint.

The causes of tic douloureux may be said to be in general unknown; but there are a few instances recorded which appear to be the consequence of external violence, wounds, contusions, &c. A modern writer has related a very curious instance of a resembling disease in the arm, where the affection proceeded from the lodgment of a small bit of a bullet in the radial nerve. (*Denmark, in Med. Chir. Trans. Vol.* 4, *p.* 48.) Dr. Parry attributed the pain to increased vascularity, or determination of blood, (perhaps amounting to inflammation) to the neurilema, or vascular membranous envelope of the nerves affected. (*Elements of Pathology and Therapeutics.*)

Stimulating embrocations, blisters, caustic issues, fomentations, leeches, frictions with mercurial ointment, (*Edinb. Med. and Surg. Journ. Vol.* 3,) electricity, opium in large doses, the arsenical solution, and a variety of antispasmodic medicines, are the principal means, which have been tried; but for the most part, they only afford partial and temporary relief. From some facts recently published by Dr. Marcet, the extract of stramonium, in doses of one-eighth and half a grain thrice a day, seems to be sometimes capable of alleviating the distressing agony of the present disorder. (See *Med. Chir. Trans. Vol.* 7, *p.* 75, *&c. also Kirby's Cases, 8vo. Lond.* 1819.)

The operation of dividing the trunk of the affected nerve, and even of dissecting out a portion of it, so as to prevent all chance of a relapse from the reunion of the ends of the nerve, is a plan, which has sometimes been practised with permanent benefit. Thus, any one of the three branches of the fifth pair of nerves may be divided at the point, where it comes out upon the face. But, before having recourse to this means, the surgeon should be sure, that the particular nerve, which he is about to expose and divide, is really the principal seat of the disease; for, when all the nerves of the face generally are affected, or when the branches of the portio dura are especially concerned, there is little hope of success. In fact, it must be confessed, that the operation has had many failures and relapses, either from the cases not having been duly discriminated, or from the neglect to remove a portion of the exposed nerve. Richerand, Delpech, and most of the leading surgeons in France express their preference to the application of the moxa, or cautery, which, they say, proves more frequently successful, than the knife. This should be done directly over the apertures, from which the nerves emerge on the forehead, cheek, or chin, and Richerand asserts, that by such treatment, the pains may always be cured, or at all events, rendered supportable. (*Nosogr. Chir. T.* 2, *p* 218, *Edit.* 4.) Delpech also affirms, that the section of the nerve very often fails, and that issues, and the repeated use of the cautery have been attended with the greatest success. (See *Précis des Mal. Chir. T.* 3, *p.* 213.) The disfigurement of the countenance by burning applications must, however, be very objectionable, and, as I think there is no positive evidence of the superiority of this method over the use of the knife, I consider what Richerand and Delpech have stated only as another instance of the extreme partiality of the French surgeons to the moxa and cauterization. Delpech confesses, however, that, when the pains seem to be the consequence of a ganglion, or thickening of a part of a nerve, the excision of such part is indispensable. There can be little doubt, that this would have been more proper than amputation in Mr. Denmark's case, to which I have already referred. The theories of Dr. Parry, senior, who was generally inclined to refer the effects of disease to increased determination of blood to the parts affected, led him to believe that the operation of cutting the nerve, as performed by Dr. Haighton and others, did good rather by the division of the arterial branch supplying the affected ramification of the trigeminus nerve, than by the division of that ramification itself. (*Parry, Elements of Pathology, &c.*)

There have been many examples of tic douloureux, which, after resisting all attempts to cure them, have been left to themselves, and, after a long time spontaneously subsided. (*Delpech, Traité des Maladies Chir. T.* 3, *p.* 212, 215.) This author has seen the operation of dividing the chief branches of the portio dura, in front of the parotid gland, undertaken, and even a portion of the soft parts cut away; but without any favourable consequences. (*P.* 218.)

I have already stated, that the nerves of the extremities are subject to affections very analogous to tic douloureux. The following instance related by Mr. Abernethy will be found interesting;—

A lady became gradually affected with a painful state of the integuments under, and adjoining to, the inner edge of the nail of the ring-finger of the left hand. No injury to the part was remembered, which could have brought on this disease. The pain occurred at irregular intervals, and was extremely severe during the time of its continuance, which was for a day or two, when it usually abated. Accidental slight injuries always produced great pain, and frequently brought on the paroxysms, which however occasionally occurred spontaneously, or without any evident exciting cause. In all these particulars, the disease correctly resembled the tic douloureux of the nerves of the face. As the pain increased, the disorder seemed to extend up the nerves of the arm. After the patient had endured this painful affliction for seven years, she submitted to have the skin, which was the original seat of the disorder, burnt with caustic. This application gave her intense pain, and on the healing of the wound, she found her sufferings rather augmented than diminished, by the experiment. After four more years of suffering, she consulted Mr. Abernethy, when the circumstances of the case were such as to render an operation indispensably necessary. The pain of the part was intolerable, and it extended all up the nerves of the arm; and this general pain was so constant during the night, as to deprive the patient of rest. The muscles of the back of the neck were occasionally affected with spasms. The integuments of the affected arm were much hotter than those of the opposite arm, and sometimes the temperature was so increased as to cause a burning sensation in them. Under these circumstances, Mr. Abernethy did not hesitate to divide the nerve of the finger, from which all this disorder seemed to originate. He laid it bare by a longitudinal incision of about three quarters of an inch in length, from the second joint of the finger, and divided it opposite to that joint, by a curved sharp-pointed bistoury, which was conveyed under it. He then took hold of the nerve with a pair of forceps, and reflecting it downwards, removed a portion of it, half an inch in length, so that the possibility of a quick reunion might be prevented. The wound was brought together with sticking plaster, and it united by adhesion; but the upper part of the wound, opposite to the upper end of the nerve, became slightly inflamed, and was very painful. However, in the course of three weeks, the appearance of inflammation gradually went off. After the operation, Mr. Abernethy pinched the originally affected integuments sharply with his nails, without causing any sensation; but if, in so doing, he moved the finger, then pain was felt. He found it difficult to convince the patient that the skin at that part was actually devoid of sensation; for she still continued to feel similar sensations to those which formerly occurred, though in a much diminished degree; but she became gradually as perfectly convinced as any medical man could be, that these sensations arose from the irritated state of the end of the nerve, above the place where it was divided. The painful affection of the nerves of the arm still continued, though considerably lessened in violence; however it was sufficiently severe to make the patient apprehend that little permanent benefit would arise from the operation. This pain continued occasionally about four months with varying degrees of severity, but the temperature of the skin was not hotter than that of the opposite side, as it had been before the operation. At the expiration of three months, the patient ascertained that the integuments at the end of the finger actually felt when any thing was applied to them, and this proved a new source of alarm. Mr. Abernethy adds, that more than nine months have now elapsed since the performance of the operation, and the general pains in the nerves have become very trivial; but the sensation in the integuments at the end of the finger, has during that time gradually increased, and the skin has now its natural sensibility, so as accurately to distinguish the tangible properties of any body applied to it. If also the originally affected part be slightly compressed, painful sensations resembling those which formerly occurred take place. (*Abernethy's Surgical Works, Vol.* 2, *p.* 203.) In a case resembling the former, but the consequence of a wound of the finger, Mr. Lawrence also cut down to the nerve, and removed a portion of it with permanent success. *Fothergill's Paper in vol.* 5 *of the Medical Obs. and Inq. Dr. Haighton's Obs. in the Med. Records and Researches. Darwin's Zoonomia. Abernethy's Surg. Works, Vol.* 2, *p.* 203, *&c. Richerand, Nosogr. Chir. T.* 2. *p.* 216, *&c. Edit.* 4. *Delpech, Précis des Maladies Chir. T.* 3, *p.* 206, *&c. Dr. S. Fothergill's Systematic Account of Tic Douloureux,* 1804. *Medico-Chir. Trans. Vol.* 4, *p.* 48, *Vol.* 7, *p.* 575, *&c. Kirby's Cases,* 8*vo. Lond.* 1819.

TINCTURA FERRI MURIATIS. This tincture has sometimes been exhibited in gleets; but a more important use has been assigned it by Mr. Cline, who orders it in dysuria from *stricture,* in the dose of ten drops every twenty or thirty minutes, until nausea is excited. Where chalybeates are indicated, this preparation is one very much approved of.

" Mr. Justamond's liquid for external use in cancers, and which the original inventor called his *panacea anticancrosa,* partook considerably of the nature of this tincture, which, indeed, with an equal quantity of spirit of wine, was sometimes substituted for it.

" Lastly, it is remarkably efficacious in destroying venereal or other warts, either used alone, or diluted with a small proportion of water." (*Pharm. Chir.*)

TINCTURA LYTTÆ. Sometimes employed in cases of gleets, and incontinence of urine, arising from a want of proper action in the sphincter vesicæ muscle. The usual dose is from ten to forty drops, twice or thrice a day: but its effects should be carefully watched; for it is apt to occasion dangerous inflammations of the urinary organs, violent stranguries, and retention of urine. It is occasionally used in various liniments, when the object is to stimulate the skin considerably, and rouse the action of the nerves and absorbents, as in certain cases of ptosis, paralysis, &c. Mr. Anthony Todd Thomson has found it an useful application in the mortification of the extremities, sometimes happening without any apparent cause; and also to frost-bitten parts. (*London Dispensatory, p.* 658, *Ed.* 2.)

TINCTURA THEBAICA. (See *Vinum Opii.*)

TINEA CAPITIS. (See *Porrigo.*)

TOBACCO is used for promoting the reduction of strangulated hernia, either in the form of a fluid clyster, or of smoke, which latter is introduced up the rectum by means of an apparatus. Excepting the operation, the power of tobacco, particularly, when assisted by the topical application of cold to the tumour, is most to be depended upon for bringing about the return of the protruded viscera. (See *Hernia,* and *Enema.*) It has also been tried in tetanus; and Mr. Earle has found tobacco clysters very efficacious in certain cases of retention of urine. (See *Tetanus,* and *Urine, Retention of.*) Consult *T. Fowler, Medical Reports of the Effects of*

Tobacco, 8vo. *Lond.* 1785. *A. P. Wilson, An Experimental Essay on the manner in which Opium and Tobacco act on the living animal Body*, 8vo. *Edinb.* 1795. *R. Hamilton, De Nicotianæ Viribus in Medicina, &c.* 8vo. *Edinb.* 1780.

TONGUE, DISEASES OF. This part is subject to various diseases, as ulcers, tumours, and such enlargements as sometimes put the patient in imminent danger of suffocation.

Carious teeth, with points and inequalities, producing continual irritation, are the most frequent cause of ulcerations of the tongue. The sores, thus arising, often resist every kind of remedy, and ignorance of the cause sometimes leads the practitioner to consider them as incurable; whereas, a cure may easily be effected by extracting the carious tooth, or simply filing off its sharp irregularities, as was anciently directed by Celsus.

The glandular papillæ which are situated on the dorsum, or upper surface of the tongue, have a narrow base, and a broad termination or head, like a mushroom. They are capable of becoming considerably enlarged, so as to form preternatural tumours, which may be mistaken for cancerous excrescences.

A young man, eighteen years of age, had on the middle of his tongue a circumscribed tumour, about as large as a middle-sized nutmeg. Louis, who was consulted, perceived that the swelling was only of a fungous nature, and he tied its base with a ligature, with the noose of which he contracted the diameter of the pedicle, while, with the ends, he kept down the tongue. Then with one stroke of a pair of curved scissors, he cut off the tubercle. Caustic was afterward applied to the base of the tumour, and the patient was perfectly well in five or six days. (*Sur les Maladies de la Langue, in Mémoires de l'Acad. de Chir. T.* 5.)

Morgagni speaks of similar tubercles; but he never advised their extirpation, not even when they were hard and scirrhous; for, if he had not deemed the operation impracticable, he should not have had any confidence in the surgeons who were consulted.

The tongue is occasionally affected with a true cancerous disease; one of the most afflicting cases, indeed, which can possibly happen, as may be conceived, when it is known, that, in the advanced stage of the disease, the patient can hardly take his food, which must be conveyed over the tongue by some means or another, before it can be swallowed, while he is obliged to write whatever he wishes to say. (See *Home's Pract. Obs. on Cancer, p.* 112.) Cancer of the tongue seems to differ from other carcinomatous affections in frequently occurring in youngish subjects. In the course of the disease, the glands behind the jaw and in the neck are sometimes affected. Louis saw a lady, who had an ulcerated cancerous tubercle on the left edge of the tongue. The little swelling was circumscribed; its size did not exceed that of a filbert; the pains were lancinating; the sore had penetrated deeply; and its tuberculated edges were affected with a scirrhous hardness. Extirpation of the disease seemed to present the only chance of cure; but the patient refused to accede to any thing but palliative plans, and she died in the course of a few months.

Forestus makes mention of four women, who were attacked with cancer of their tongues, and died from the ravages of the disease, and hemorrhage. In the writings of Hildanus, there is a description of the origin and progress of a cancerous tubercle on a young man's tongue, whose breath was intolerably fetid and who died in the most excruciating pain. The same author informs us of another case, exhibiting the good effects of sedative remedies in palliating a cancerous ulcer of the tongue, and the fatal consequences of an opposite line of conduct. In authors, many other examples of the same kind are to be met with.

Surgery, however, is not destitute of resources against diseases of so formidable a nature. The following case exemplifies the benefit which may be effected by this useful profession, when not exercised by men of too timorous a character.

An elderly woman had an ulcerated hardness on her tongue. It had been several times cut away, and as repeatedly returned. Ruysch was called into consultation with one of the surgeons, who was attending the patient, and who had already extended his incisions very deeply for the removal of the disease. The result of their deliberations was another attempt to extirpate the tumour, and they also determined that after it had been cut away, the actual cautery should be freely applied, with a view of destroying the roots of the fungus. The patient consented to the plan, and bore the operations with great fortitude. The tongue was taken hold of with a cloth, and Pierre Le Memnonite, a surgeon of eminence, removed the disease with a curved bistoury. The inside of the mouth was then protected with wet cloths, and the actual cautery applied several times to the wound in the tongue. The pain was appeased, and the separation of the eschar promoted by emollient gargles. Under the use of a gargle of honey of roses, and the tincture of myrrh and aloes, the place soon healed.

It is much easier to cut off a portion of the tongue, through all its diameter, than to remove a cancerous ulceration, situated at one of its edges.

In both cases, there is a good deal of difficulty in fixing the part, for it is so very moveable, that it is not easy to keep it in a steady position. For this purpose, Louis recommended the employment of forceps, with blades terminating in hook-like extremities. With this instrument, the part of the tongue to be amputated can be kept from slipping away.

However, very malignant ulcers on the tongue have sometimes been cured by milder means. Sores of this description are reported to have yielded to the repeated application of leeches under the tongue, after a vast number of other remedies had been tried in vain. In the *Encyclopédie Méthodique, art. Langue*, there is an account of a very alarming affection of the tongue, (reputed to be cancerous, though this may be doubted,) which got completely well under a very simple plan of treatment. A woman, thirty-five years of age, subject to cutaneous diseases, and ill-conditioned ulcers, complained, for seven or eight months, of little swellings, accompanied with heat and pain, which made their appearance on the edge, and towards the apex of the tongue. At length, the part affected began to swell, grow hard, and cause lancinating pains. Its surface became irregular and rough; and all the side of the tongue was considerably swelled. The patient could not put her tongue out of her mouth, nor swallow any thing except liquids; and her breath was intolerably fetid. Various sedative remedies had been employed without success. Cicuta had been used as a topical application; it had been exhibited internally in large doses; the patient had taken for a long while, the oxymuriate of mercury; but nothing proved of any avail. At length the patient was so tired of trying the effects of medicines and applications, that she gave them up entirely; and contented herself with trying the experiment of keeping some honey continually in her mouth. As this method seemed to give her some ease, she was prevailed upon to persist in it, and in this way, the pains were gradually appeased; the swelling was diminished, and at the end of two or three months, the woman was quite well, except that an indurated cicatrix remained on the part affected, and considerably obstructed the extension of the tongue on that side.

On this case, however, it might be remarked, the retardation of the cure seems also ascribable to the injury of the health produced by the hemlock, mercury, &c. and that the amendment, following their discontinuance, might rather arise from the consequent improvement of the patient's health, than from any effect of the honey.

Many writers confirm the fact, that very inveterate diseases of the tongue are sometimes cured by hemlock. In the work last cited, is mentioned an instance of a very unhealthy looking ulcer, near the apex of the tongue, attended with a considerable thickening of the part, and of some duration, which was cured by giving large doses of cicuta. But of all the medicines which have the greatest reputation for their beneficial effects upon malignant ulcers of the lip and tongue, none perhaps is deserving of so much confidence, as arsenic. (See *C. Lane's case of ill-conditioned Ulcer of the Tongue, successfully treated by arsenic; Med. Chir. Trans. Vol.* 8, *p.* 201.)

However, notwithstanding many facts of this kind on record, medicines should not be tried too long, that is to say, so as to let the disease attain a condition, in which it will no longer admit of being cut away. When the disease makes progress, the knife should be employed before it is too late.

When any part of the tongue is to be amputated, authors very properly recommend the chief vessels to be tied, if possible; but when this cannot be accomplished, they advise the employment of astringent gargles, such as a strong solution of alum, distilled vinegar, or diluted sulphuric acid. When these methods fail, the continental surgeons recommend the actual cautery as the only resource. Where only a piece of the tongue is cut out, in the shape of the letter V, the best mode of stopping the bleeding is to bring the sides of the incision together with a suture, by which means the deformity will also be lessened, and the union expedited, as is exemplified in a case recorded by Langenbeck. (*Neue Bibl. B.* 2, *p.* 489.) Rather than suffer a patient to die of hemorrhage, if the cautery and other means fail, the lingual artery should be taken up where it passes over the cornu of the os hyoides. Diseased portions of the tongue admit of removal with the ligature. (*La Motte Chirurgie Obs.* 208; *Godart in Journ. de Med. T.* 13, *p.* 66; *Sir Everard Home, Pract. Obs. on Cancer, p.* 207; *Inglis, in Edinb. Med. and Surgical Journ.* 1805, *No.* 1, *p.* 34.) Sir Everard Home generally passed a double ligature through the centre of the tongue, behind the diseased portion, and then tied the threads tightly over each half of the organ, so as to make all the part in front of the constriction slough away.

The whole of the tongue sometimes inflames, and becomes considerably enlarged, either spontaneously, and without any apparent cause, or in consequence of some other disease; or else from some particular irritation, such as that of mercury, or some poisonous substance. Slegel, a German physician, who was at Paris about the middle of the 17th century, saw a patient in a salivation, whose tongue became so enormously enlarged, that the mouth could not contain it. Pimprenelle, an eminent surgeon of that time, was sent for, and finding that all trials to relieve the affection were in vain, amputated one half of the tongue, with the view of preventing its mortification. After the wound had healed, it is said the patient could articulate very well. Louis, from whom this fact is quoted, very justly remarks, that the measure resorted to by Pimprenelle was an exceedingly violent one; for he has often seen urgent symptoms occasioned, during a salivation, by a rapid and enormous swelling of the tongue, very quickly yield to bleedings, purgative glysters, change of air, and leaving off mercury. Two or three facts, confirming this statement, have fallen under my own notice.

Trincavellius mentions two women, who had considerable enlargements of their tongues. One of these patients, who was young, had been rubbed with mercurial ointment even on her head; and the other, who was about fifty years old, had her tongue attacked with the ravages of the small-pox. The excessive swelling of the tongue, in both these instances, terminated in resolution.

When the urgency is such, that an immediate diminution of the swelling becomes necessary for the relief of the symptoms, the plan of making one or two deep incisions along the tongue is strongly recommended. See the cases inserted by De la Malle, in the 5th vol. 4to. of the *Mem. de l'Acad. Chirurgie*, and some others, related by Louis in the paper above cited.

A man, recovering from a bad fever, was suddenly attacked with a pain in his tongue, followed by a swelling equally large and rapid in its formation. In less than five hours the part became thrice as large as it is in its natural state, and in this space of time De la Malle, who had been consulted, had bled the patient successively in his arm, neck, and foot. The man felt very acute pain; his skin was excessively hot; his face was swelled; his pulse was hard and contracted; and his look wild. He could hardly breathe: the tongue filled all the cavity of the mouth, and protruded out between the lips. In this very urgent case, the mouth was kept a little more open than the swelling of the tongue actually caused it to be, and three parallel incisions were made along this organ, one along its middle, and the other two between the one in the centre and the edges of the part affected. The cuts extended through two-thirds of the preternatural swelling, and had all the good effect which could possibly be desired. There was a great deal of hemorrhage, and the enlargement of the tongue subsided so much, that, an hour after the operation, the patient was able to speak. The next day the incisions had the appearance of being only superficial scarifications, and the tongue was in its natural state. In short, the incisions healed in a few days, with the use of a simple gargle.

De la Malle quotes several other cases, all of which tend to show the success which he met with from this practice in other similar cases. He confirms his own sentiments, by quoting the testimony of some authors, antecedent to him, who have recommended the method; and in particular, he cites a case, in which Job à Meckren adopted this practice, in a case where the tongue, together with the tonsils and palate, became spontaneously affected with a sudden and dangerous degree of swelling.

From the preceding observations it may be concluded, that making incisions in the tongue would have saved numerous patients, who have been suffocated in consequence of enormous enlargements of this organ. In the small-pox, the tongue sometimes becomes immensely swelled; and it is more than probable, that, in many instances, the employment of the above method would have afforded great relief to patients, whom the disease has been known to have entirely bereaved of the power of swallowing. It is a curious fact, that after the loss of very considerable portions, or even what may be called the whole tongue, patients often recover the power of speech, mastication, and deglutition. (*Louis in Mém. de l'Acad. de Chir. T.* 5; also, *J. Rowland, Aglossostomographie, ou Déscription d'une Bouche sans langue, laquelle parle, et fait naturellement toutes ses autres fonctions*, 12*mo*, *Saumur*, 1630. *Louis, sur les Maladies de la Langue, Mémoires de l'Acad. de Chir. T.* 5; *also the memoir of De la Malle in the same volume. Encyclopédie Méthodique, Partie Chir. art. Langue. Sir Everard Home's Pract. Obs. on Cancer*, 8*vo*, *Lond.* 1805. *Langenbeck, Neue Bibl. B.* 2, *p.* 487, 8*vo. Hanover*, 1820.)

TONSILS. The tonsils, like all other parts at the back of the mouth, are subject to different kinds of swelling, which vary as much in their nature as their consequences. Some are rapid in their progress, and these are frequently observed to affect persons of, what is termed, a sanguineous temperament. They are also prone to attack young people, and such as labour hard, and they have all the essential characters of inflammation.

Other swellings of the tonsils are slower in their progress, occur in damp cold weather, and in indolent, and, what the old physicians used to call, phlegmatic constitutions.

Lastly, another kind of enlargement of the tonsils, which is usually contagious, readily falls into a sloughing, gangrenous state, sometimes extends to the neighbouring parts, and too often proves fatal. Hence the various species of angina have been named by some writers inflammatory, catarrhal, and gangrenous. The two first kinds frequently terminate in resolution; but sometimes the affected tonsils afterward assume a scirrhous hardness, obstruct respiration and deglutition, so that it becomes indispensably necessary, either to extirpate the diseased parts with the ligature or knife.

The cutting away of enlarged tonsils was an operation which was performed by the ancients, and in different ways. Sometimes they tore with their fingers the membrane covering the tonsil, and then pulled this part out of the situation which it occupies between the pillars of the velum pendulum palati. In other instances, in which they experienced too much resistance, they seized the diseased tonsil with a kind of hook, and then cut it away with a bistoury, which, Paulus Ægineta informs us, was concave on the side towards the tongue.

The moderns, who, for a long while, were timid in the employment of both these methods, adopted plans of a more cruel description. The actual cautery was proposed, and some partial success which followed its use, at once established its reputation. Caustics were afterward employed, instead of actual fire; but the inconvenience of not being able to limit their action, and the hazard of their falling down the œsophagus, soon caused them to be relinquished by all rational practitioners. Then the operation of cutting away the tonsils was revived, and it was performed, sometimes in the manner of the old surgeons, sometimes with various kinds of curved scissors, or knives. Instead of the simple tenaculum used by the ancients, a sort of double one came into fashion.

Bichat describes the following, as once the common plan: the surgeon is to open the mouth very wide, and depress the tongue with any flat instrument, which is to be held by an assistant. The operator is then to take hold of the diseased tonsil with a tenaculum, and with a common scalpel, having the back half of its blade covered with rag, he now removes as much of the tonsil as ought to be taken away. In common cases, it is deemed sufficient to cut on a level with the pillars of the velum pendulum palati. Any other portion, needing removal, should next be taken away. The operation being finished, the patient is frequently to wash his mouth with proper gargles.

The preceding method was long adopted by Desault. However, one objection is urged against it, viz. that when the end of the knife is conveyed far into the mouth, it may do mischief, not (as has been alleged) to the internal carotid artery, the backward situation of which completely keeps it out of all danger of being wounded, but to the membranous covering of the palate, in a place not corresponding to the tonsils. Desault thought this objection was the more forcible, as when the hook is introduced into the tonsil, the danger of the above mischief is considerably increased by a general spasm, which seems to affect every part of the mouth. Hence this eminent surgeon used to employ, for the removal of diseased tonsils, an instrument, which was first invented for dividing cysts of the bladder. It consisted of a sharp-edged blade, which was included in a silver sheath. The latter had at its extremity a kind of notch, in which the gland, which was to be extirpated, was received. The rest of the instruments were similar to those commonly used. Desault proceeded as follows:

1. The patient being seated on a high chair, with his head supported on an assistant's breast, he is to open his mouth very wide, and the lower jaw is to be kept thus depressed, by some solid body placed between the teeth, and held there by an assistant.

2. The tongue is to be kept down with a broad spatula.

3. The surgeon is next to take hold of the tonsil with a double hook, with which he is to raise and draw it a little towards him. He is then to take the above cystitome, and put the tonsil in the notch, on a level with the place where the incision is intended to be made.

4. When the portion which is to be cut off, is engaged in the notch, the operator is to draw the part towards him, so as to stretch it, and press the instrument against it from below upward. The blade being next pushed across the notch, the necessary section is accomplished. When the division is not complete, which is particularly liable to happen, when the diseased gland is of considerable magnitude, the blade is to be drawn back, and the section completed by applying the instrument to the wound, which it has already made. Sometimes even a third application may possibly become requisite.

5. The patient is to be directed to wash his mouth. Bichat states, that this plan of operating, adopted by Desault, is as simple and easy as the method above related, with the advantage of being safer. Such is the construction of the blade of the instrument, that when it slides across the notch, it presses against, and steadily fixes the parts which are to be divided; an advantage which neither the knife nor scissors have, under the action of which the parts are quite moveable. Hence there is difficulty in cutting them. When the introduction of the instrument from above downward is difficult, it is better to withdraw it; and, after turning the notch in the opposite direction, pass it from below upward. In general, however, the first of these methods is preferable, because the gland, when half cut through, cannot now fall back and obstruct the rima glottidis, so as to bring on danger of a sudden suffocation; a circumstance which Wiseman and Moscati saw happen. With a view of preventing this occurrence, Louis recommended the common scalpel to be used, with its edge directed upward, as has been advised for the above instrument; which latter contrivance, however, being, according to Bichat's account, more easy and safe, merits the preference. Besides the advantage of fixing the soft parts, which are to be cut, it has that of not contusing them, like most other instruments of this nature, as, for instance, scissors. The oblique disposition of its blade enables it to divide parts, in the manner of a saw.

This invention, as Bichat allows, is certainly increasing the number of surgical instruments; a thing, which all the best modern surgeons endeavour to avoid. But it is to be recollected, that this instrument is not exclusively applicable to any particular operation. It may be employed for cutting away the tonsils and uvula; dividing membranous fræna in the rectum, vagina, and bladder; amputating fungous excrescences, polypi of the nose, (if this mode of extirpating them were preferred) and various tumours in general, which are deeply situated in different cavities of the body, where instruments introduced unguardedly might injure parts which should be avoided, or where the base of the tumour should be steadily fixed, when its division is to be accomplished. The latter object cannot safely be effected by scissors. When the base of the tumour is too large to be received in the notch, one part is first to be divided, and then another, till its whole thickness is cut through.

In England, when a diseased tonsil is to be cut away, surgeons generally prefer a common scalpel.

As a general practice, I consider, that the excision of an enlarged tonsil is a better practice than the extirpation of it with a ligature, which also sometimes answers very well, and, perhaps, in children and timid patients may merit the preference. The chief objections to the ligature are, that its operation is rather tedious, sometimes productive of a great deal of irritation, and, on the whole, at least as painful as the knife.

Moscati having once adopted this plan, very severe pain and inflammation ensued; the difficulty of swallowing and breathing compelled him to amputate the tumour at the place where the ligature was applied, and all the bad symptoms immediately ceased. Besides, when the ligature is used, there is no oozing of blood from the vessels, a circumstance which tends so much to diminish the inflammation. The base of the swelling is also sometimes broader than its upper part, and does not admit of being properly surrounded with a ligature. And, when it has a narrow base, it can then be so easily removed with a scalpel, or with Desault's instrument, and with so little pain, that one of the last modes is generally preferable.

The ligature, however, has had its advocates. Heister recommends it, in certain cases; Sharp praises it; and others approve its use; while the plans of employing it have been as various as the inventive genius of the different partisans of the practice. Some make use of Levret's double cannula, which is furnished with a silver wire noose, in which the tumour is to be engaged By twisting the instrument, the diseased part becomes constricted; and this plan being repeated every day, the circulation is intercepted, and the gland mortifies, and sloughs away. Some, after putting the noose of a ligature over a kind of tenaculum, hook hold of the tonsil, push the ligature over the enlarged gland, which they tie, without having any means of increasing the constriction afterward. Some employ Belloque's instrument for putting the ligature over the tonsil. Others require no instrument whatever for the purpose, and accomplish the business with their fingers.

Desault employed an instrument, which the French call *un Serre-nœud*, which is in fact, nothing more, than a long, narrow, round piece of silver, terminating at one end in a little ring, or hole, and, at the other, in a kind of groove or notch.

The following was Desault's method of extirpating the tonsils with a ligature.

1. The patient was seated on a high chair, with his head held back, on an assistant's breast; his mouth was opened very wide, his tongue depressed, and the diseased tonsil taken hold of with a double hook.

2. The surgeon took the *serre-nœud*, in which a ligature had been passed, so as to form a noose. The noose was put over the handle of the hook, which was committed to the charge of an assistant, and the noose then pushed over the tonsil, so as to embrace it completely.

3. The surgeon now drew the ligature strongly towards him, and pushed forward the *serre-nœud*, so as to produce the requisite constriction of the tumour. In general, the ligature was not made very tight the first day.

4. When the necessary constriction had been made, the double-hook was withdrawn, and the ligature twisted round the notch, at the outward end of the instrument.

5. The next day, the gland became unusually large, in consequence of the impediment to the return of the venous blood. The ligature was unfastened from the notched end of the instrument, and drawn more out, so as to increase the constriction, after which it was again twisted round the notch. This plan was followed up till the tumour was detached, which usually happened on the fourth, or fifth day.

Mr. Chevalier, a few years ago, described a particular mode of passing and securing the ligature. He passes a flat spear pointed hook behind the diseased tonsil, and its point is then pushed forward, so as to perforate it through the middle of its base. The needle is then to be withdrawn, and an eye-probe, very much curved, and armed with a long double ligature, may then be readily passed through the perforation, and brought out at the mouth, the ligature divided, and one portion tied round the upper half of the tonsil, and the other round the lower. "A single knot being first made upon one end of the thread, the end so knotted, is to be brought forward upon the other, and to make a single noose upon itself including the other, and to be drawn tight upon it, close to the first knot. The free end of the thread is then to be passed" through a ring at the end of an instrument for the purpose, and "being then held firm, and the ring pushed forward upon the knot, the loop, now formed, may be readily tightened, so as completely to strangulate the diseased part; and in the same manner, it may be tightened, from day to day, till the part is entirely detached." (See *Med. Chir. Trans. Vol.* 3, *p.* 80, *&c.*) The subject is more intelligible with the plate.

In cases of angina, the tonsils are sometimes suddenly attacked with such a degree of swelling, that respiration is dangerously obstructed. This case is analogous to the occasional enormous inflammatory swelling of the tongue, and, if it resist venesection and leeches, the most prompt mode of relief is that of making several deep scarifications with a knife in the part. Many cases, confirming the good effects of this practice, have been seen by Langenbeck. (See *Neue Bibl. B.* 2, *p.* 492, *&c.*)

TOPHUS. A swelling, which particularly affects a bone, or the periosteum. See *Node.*

TORTICOLLIS. (from *torqueo*, to twist; and *collum*, the neck.) The wry-neck. See *Wry-neck.*

*TOURNIQUET. (*French*, from *tourner*, to turn.) An instrument used for stopping the flow of blood into a limb, until some requisite operation has been performed, or some more permanent plans of checking hemorrhage have been put in practice.

The old surgeons used to surround the limb with a band, with which they made such a degree of constriction, that the circulation was quite stopped. They also believed, that the pressure of the band was advantageous, in benumbing the limb, and moderating the pain of operations.

The violent pain and contusion, however, which such a tourniquet occasioned, being frequently followed by mortification and abscesses, surgeons found it necessary to devise some other method of checking hemorrhage. The application of the circular band was first improved, so that it caused less pain, and less mischief to the skin. The limb was surrounded with a very thick compress, over which the band was placed. Two small sticks were next put under the band; one on the inside, the other on the outside of the limb; and they were twisted till the band was rendered sufficiently tight. It is in this manner, says Dionis, in his *Traité d'Opérations*, that carriers tighten the cords which fasten the bales of goods in their carts. A French surgeon, named Morel, is said to have made this first improvement in the application of tourniquets.

J. L. Petit, in 1718, presented to the Academy of Sciences a tourniquet of his own invention, which was much more perfect than any previously contrived. It consists of two pieces of wood, one of which is superior, the other inferior. The inferior piece is about four inches and a half long, and nearly two broad. Its under surface is somewhat concave, while its upper one is a little convex, and the ends are hollowed out. From its middle part rises a round eminence, about seven lines high, and eight and a half broad. The superior piece is almost the same as the inferior one, but rather shorter. The eminence, which ascends from its middle part, is six lines high, and an inch and a half in diameter. This eminence is hollow within, and calculated to receive a wooden screw, the top of which is a sort of button for turning the screw. The grooves of Petit's screw were about four, or five, and each of them four lines in diameter, in order that a half turn might produce the necessary effect. Lastly, all the pieces of the instrument were fastened together with an iron pin, which went through the middle of the two pieces of wood, and through the whole length of the screw. This iron pin was riveted under the inferior piece, and at the top of the button, in such a manner, however, that the screw was capable of turning on it, as on a pivot.

In order to apply this tourniquet, the limb is to be surrounded with a double strap, about four finger-breadths wide, and made of chamois leather, which is the softest material that can be used. To one end of the strap a double little cushion is fastened, of the same length and breadth as the lower piece of the tourniquet. A narrow compress, or cylindrical pad, is also requisite, for the purpose of compressing the track of the vessels. This compress consists of a very firm roll of linen, covered with chamois leather. The ends of a piece of tape are sewed to the outer part of the pad, and thus the tape leaves a passage for the leather strap. By this artifice, the pad can be moved to any situation on the strap, as the bulk of the limb may require. The middle of the tape is to be fastened to the outside of the leather strap. The cylindrical compress, or pad, is to be put over the course of the vessels. The double cushion is to be placed on the opposite side of the member, while the leather strap is to surround the limb. All the different pieces of the apparatus are next to be retained by means of the tape, which is to be tied at the side of the cushion.

The tourniquet is now to be put over the cushion, on that side of the limb which is furthest from the track of the large vessels, and is to be fastened in this situation with a double band, that has a hole in it for the reception of the upper part of the screw.

In order to make the proper compression, the screw is to be half turned round, from the right to the left. The upper piece of the tourniquet becoming now further from the lower one, the double band draws the pad, and presses it against the vessels, so as to make the due degree of compression.

The following are the advantages, attending the use of Petit's tourniquet: 1. It compresses the lateral parts of the limb less than the tourniquet previously in use. 2. It requires the aid of no assistant, either to hold, tighten, or loosen it. 3. The operator is able of himself to stop the flow of blood in the artery, by means of the screw. 4. When there is any danger of hemorrhage after an operation, this kind of tourniquet may be left on the limb, and, in case of the bleeding coming on, the patient, if no one be at hand, can tighten the instrument himself, as much as is necessary. 5. The constriction, which this tourniquet produces, does not create any danger of mortification, because it does not altogether stop the flow of blood through the collateral arteries.

The tourniquet here described is certainly very complex, when compared with that which is used by the best modern practitioners; but, still it is the original of the latter, and both are constructed on the same principles. All the pieces of modern tourniquets are kept connected together, and instead of two pieces of wood, used by Petit, there is contrived a brass bridge, which is capable of being elevated, or depressed, by means of a screw, made of the same metal. Over this bridge a very strong band proceeds, and by passing under two little rollers, at each end of the bridge, it always remains connected with the instrument. A convex firm pad is sewed to the band, and put immediately over the artery, where the instrument is applied. There are no cushions for the opposite side of the limb under the screw; but a thick piece of leather through which the band proceeds in two places, is always situated under the lower surface of the brass, and serves to prevent any bad effects of its pressure. It is usual also for the surgeon to fold some rag, and to put it in this situation, at the time of applying the instrument. (See *Hemorrhage.*) The interruption of the circulation in parts of the body by the tourniquet, has been tried as a means of relieving diseases. (See *G. Kellie, Obs. on the Medical Effects of Compression by the Tourniquet, 8vo. Edinb.* 1797.)

TRACHEA, Wounds of. See *Throat.*

TRACHEOTOMY. (from τραχεια, the windpipe, and τεμνω, to cut.) The operation of cutting an opening into the windpipe for various surgical purposes. See *Bronchotomy.*

TREPAN. (from τρυπαω, to perforate.) *Trepanum; Terebellum; Modiolus.* A circular saw, by means of which the skull is perforated in the operation called *trepanning*, or a circular portion of any bone may be sawn out. It bears a considerable resemblance to the well-known instrument named a wimble, and is worked in the same manner. Formerly, the saw was sometimes made of a conical shape; (see *Abaptiston*) but this construction rendered the action of the instrument difficult. In this country, the trepan is now superseded by the instrument called a *trephine*, which has a different handle, and is not worked in the same way. On the continent, however, the trepan still has the preference.

TREPHINE. The instrument now commonly preferred for perforating the cranium, for purposes which I shall presently explain. It consists of a simple cylindrical saw, with a handle placed transversely, like that of a gimlet; and, from the centre of the circle, which the teeth of the saw describe, a sharp little perforator projects, named the centre-pin. The upper part of the centre-pin is made to screw in a corresponding hole at the inside of the top of the saw, and is capable of being taken out, or put in, at the surgeon's option, by means of a little key for the purpose. Its use is to fix the trephine, when it is first applied, that is, before the teeth of the instrument have made a sufficient circular groove, in which they can steadily work. When this has been accomplished, the centre-pin must always be removed; because now it is not only not needed, but if left, it would retard the progress of the operation, and inevitably wound the dura mater and brain, when the teeth of the saw had cut to a certain depth through the cranium. My trephines have their centre-pins contrived to slide up, or down, and to be fixed in either position by turning a little screw. This method seems to me both ingenious and convenient.

The cylindrical part of the trephine is often termed the *crown* of the instrument. The surgeon should have at least two or three cylindrical saws of various sizes; for it is always a commendable rule, never to saw away any more of the cranium than is absolutely requisite for the accomplishment of some rational object. There is no occasion, however, for having any more than one handle, which may be made to screw on any of the saws.

Trephines are also occasionally applied to other bones, besides those of the cranium. In the articles *Antrum, Caries, Exostosis, Fractures of the Sternum, Necrosis, Spina Ventosa*, other cases are mentioned, in which the employment of these instruments sometimes becomes proper.

It is not always desirable to remove a complete circular portion of the cranium, the taking away a piece of smaller size, and of a different shape, being frequently much more advantageous. Some surgeons, I understand, who object to removing any unnecessary quantity of the cranium, have been in the habit of employing a trephine, terminating only in a semi-circular, instead of a circular saw, by which means they can often cut across the base of a depressed portion of the skull, and take it away, without any occasion for removing also a circular piece of bone. An instrument of the latter kind may certainly be sometimes useful.

The saws, however, which Mr. Hey has described, should constantly be kept in every case of trephining instruments. This practical writer remarks, that "the purposes for which any portion of the cranium is removed, are, to enable the surgeon to extract broken fragments of bone, to elevate what is depressed, and to afford a proper issue to blood or matter that is, or may be, confined, &c.

"When a broken fragment of bone is driven beneath the sound contiguous part of the cranium, it frequently happens, that the extraction cannot be executed without removing some of the unbroken part, under which the fragment is depressed. This might generally be effected with very little loss of sound bone, if a narrow portion of that which lies over the broken fragment could be removed. But such a portion cannot be removed with the trephine. This instrument can only saw out a circular piece. And as, in executing this, the central pin of the saw must be placed upon the uninjured bone, it is evident that a portion of the sound bone, greater than half the area of the trephine, must be removed at every operation. When the broken and depressed fragment is large, a repeated application of the trephine is often necessary, and a great destruction of sound bone must be the consequence.

"When the injury consists merely of a fissure with depression, a small enlargement of the fissure would enable the surgeon to introduce the point of the elevator, so as to raise the depressed bone. But a small enlargement of the fissure cannot be made with the trephine. When it is necessary to apply the elevator to different parts of the depressed bone, a great deal of the sound cranium must be removed, where a very narow aperture would have been sufficient.

"The same reasoning will apply to the case of openings, made for the purpose of giving a discharge to extravasated blood or matter.

"If a saw could be contrived which might be worked with safety in a straight, or gently curvilineal direction, it would be a great acquisition to the practical surgeon. Such a saw I can now with confidence recommend, after a trial of twenty years, during which time I have rarely used the trephine in fractures of the skull. Its use has been adopted by my colleagues at the General Infirmary in Leeds; and will be adopted, I hope, by every surgeon who has once made trial of it." Mr. Hey next informs us, that the instrument was first shown to him by Dr. Cockell, of Pontefract; but that there is a saw formed on the same principle in Scultetus's Armamentarium Chirurgicum. The saws alluded to are very short ones, fixed at the end of a longish straight handle: their edges are made either straight or semicircular. The latter construction qualifies the instrument for cutting in a curvilineal direction, which is often proper. The edge of the saw should always be made a little thicker than the rest of the blade, by which means it will work in the groove, which is cut with more facility.

Saws made on the principle just described, are also of infinite use in cutting away diseased portions of other bones, besides the skull, exostoses, &c. In cases of necrosis, when a dead part of a bone is quite wedged in the substance of the surrounding new bony matter, Mr. Hey's saws may often be advantageously employed for cutting away the parts, which mechanically prevent the detachment of the dead pieces. The saws invented by Mr. Machell and Professor Graefe, are also highly ingenious, and particularly merit attention, when there is very little room for the working of the instrument, and the bone to be cut lies rather deep. They are wheel-like saws, turned by machinery.

Besides trephines of various sizes, and the saws just now noticed, the surgeon should also take care to have in his case of trephining instruments a little brush for occasionally cleansing away the particles of bone from the teeth of the saw in the progress of the operation; a pair of forceps for extracting the round piece of bone after it has been detached by the saw; a lenticular for removing any inequalities which may present themselves round the sawn edge of the cranium after the circular piece is taken out; a raspatory for the same purpose, and also for scraping the bone in order to see whether it will bleed, which is a circumstance in some cases very important to be attended to; (see *Head, Injuries of;*) a largish common scalpel for dividing the scalp, &c.; and some elevators for raising depressed pieces of bone.

The common elevator is now generally used by all the best English surgeons; but several others have been proposed, as, for instance, the tripod elevator; and another invented by J. L. Petit, and afterward improved by M. Louis.

Before beginning the description of the operation, I think it highly proper to remind the reader of what has been so forcibly dwelt upon in the article, *Head, Injuries of,*—that, generally, the removal of pressure off the brain, which pressure must also actually occasion dangerous symptoms, can form the only true and vindicable reason for employing the trephine, or sawing away any portion of the skull. There are very few exceptions to this remark: it may, indeed, be now and then proper to saw away the bony edges around some fungous excrescences, which grow from the dura mater, and make their way outward, by occasioning an absorption of the part of the skull immediately over them. (See *Dura Mater.*) It may also be sometimes proper to saw out diseased portions of the skull, though, it must be confessed, that in general their separation should be left to time and nature.

In the records of surgery, innumerable facts may be consulted, where the prudent and judicious employment of the trepan has effected wonderful cures, and been the only thing by which the patients' lives could possibly have been saved. The benefit which the operation brings about, is also sometimes so sudden and astonishing, that in no instance does the interposition of the surgical art display itself to greater advantage. The immediate restoration of sight by the depression, or extraction of an opaque substance from the eye, is not more beautiful and striking, than the instantaneous communication of the intellectual faculties, and of the powers of speech, of feeling, &c. together with voluntary motion, to a person lying in an apparently lifeless state from an injury of the head. The utility of the trepan is occasionally manifested even in this degree. In the valuable essay of Mr. Abernethy on injuries of the head, a case may be seen, in which the patient, who had been in a condition almost bereft of animation, rose up and spoke the instant the extravasated blood was removed from the surface of the brain. And among the wounded at the battle of Waterloo, there was a soldier of the 44th regiment, whose case is of equal interest. He had been struck by a musket-ball on the right parietal bone, which was exposed, but had no appearance of being fractured. As however the symptoms of compression were urgent, and the patient was in nearly a lifeless state, I conceived it right to apply the trephine to the part on which the violence had acted. I had not sawn long before the external table came away in the hollow of the trephine, leaving the inner table behind, which was not only splintered, but driven at one point more than half an inch into the membranes and substance of the brain. No sooner were the fragments taken out with a pair of forceps, than the man instantly sat up in his bed, looked round, and began to speak with the utmost rationality. It is a most extraordinary fact, that this patient got up and dressed himself the same day, without leave from the medical officers, and never had a bad symptom afterward.

Immediately the operation was finished, the temporal arteries were opened, and some purgative medicines exhibited.

In a case of fungus of the dura mater, with diseased bone, mentioned by Schmucker, the trepan was applied eleven times in less than a month, and the operation used to cause so little indisposition, that the patient hardly ever required to go to bed afterward, and, on one occasion, actually went to market an hour after its performance. (*Wahrnehmungen, B.* 1, *p.* 456.)

Let not the young surgeon, however, draw from these dazzling cases of success an immoderate solicitude to perform the operation; for it should never be undertaken but in the most pressing circumstances, and when the symptoms unequivocally show that a dangerous degree of pressure on the brain exists. I recollect an unfortunate example, in which the late Mr. Ramsden, of St. Bartholomew's Hospital, ventured to saw out a portion of the frontal bone for a mere long-continued pain in the part: the patient was attacked with inflammation of the dura mater, and perished in three or four days. We may therefore conclude, that the operation is not itself exempt from danger; and it is certain, that it ought never to be resolved on without deep consideration. "*Gravis tamen satis est operatio, ut nunquam, nisi indicationes sufficientes adsint, institui debet.*" (*Callisen Syst. Chir. Hodiern. Tom.* 1, *p.* 658.)

The trepan, or trephine, is never necessary in injuries of the head, except for the purpose of relieving the brain from pressure. Such pressure may be caused by a depressed portion of the cranium, or it may be produced by an extravasation of blood, or the lodgment of matter, betwixt the skull and the dura mater. The chief danger of concussion, when the accident is not directly or soon fatal from the disorganization and mischief done to the brain, depends upon the consequent inflammation of this organ, and therefore can be little likely to be benefited by the use of the trepan. If the operation becomes proper in such a case, it is when an abscess has formed under the cranium, and when the confined matter itself creates bad symptoms by its pressure on the brain. This state of things, however, cannot come on till after the inflammation of the brain and its membranes has prevailed a certain time, and it is always accompanied with a detachment of the pericranium and a puffy tumour of the scalp; or, if there be a wound of the latter part immediately over the abscess, the lips of the injury suddenly acquire an unfavourable appearance, and lose their vermilion colour. The patient has also had much preceding febrile disorder, pain and tension over the whole head, redness and turgescence of the eyes, and generally more or less delirium. When the matter is forming, there are usually some rigours, and, as soon as it is formed, the patient falls into a comatose state, and paralytic symptoms show themselves. Here the urgency for the prompt application of the trephine is very great, and the patient's chance of living is almost essentially connected with the immediate performance of the operation. This important case has been particularly dwelt upon in the writings of Mr. Pott.

In the article, *Head, Injuries of,* I have laid down the most remarkable symptoms of concussion, and compression of the brain, a subject which every surgeon should study with earnest attention, before he ever presumes to employ the trepan. For, sometimes these accidents are extremely difficult to be discriminated; sometimes they exist together in the same individual; a complication which is peculiarly embarrassing; and in every instance where the symptoms are those of concussion, the operation, so far from being indicated, would be a step of all others the most likely to do harm, by increasing the irritation and inflammation of the brain and its membranes. A fall upon the back, or upon the head, occasions a direct concussion of the brain, and the shock not being materially weakened by the intervention of any yielding elastic structure, is the more dangerous. When a person has fallen from a certain height, and pitched on his head, his back, the buttocks, the knees, or even the soles of the feet; when he has been instantly deprived of his senses, and then by degrees recovered them and come to himself again; the fact of his having suffered concussion of the brain is clear and indisputable. Concussion has likewise taken place, though in a slighter degree, when the patient has been only stunned by the fall, and experienced a sensation of sparks. But a multitude of degrees separate this feeble concussion from that in which the substance of the brain is instantaneously disorganized, so that the patient has not the possibility of recovery.

The symptoms of concussion of the brain are attended with coma, and the compression of this organ by an extravasation is also accompanied with lethargic heaviness. How then is the surgeon to ascertain, whether the comatose disorder arises from one or the other of these affections?

Here in order to avoid repetitions, I beg leave to refer to the observations already made in the article quoted above. But there is one criterion of such first-rate importance, that it may prevent innumerable fatal mistakes, and, indeed, without the continual recollection of it, no man ought to be rash enough to interfere with this dark and abstruse part of surgery. On this account, I shall mention it here, notwithstanding it has been already noticed elsewhere. If the patient is knocked down and stunned directly by the blow, and remains in a state of insensibility, these primary symptoms are ascribable to the concussion. On the contrary, when the coma and loss of sense do not take place till an hour or two after the blow, they are to be imputed to an extravasation.

The shock given to the brain by concussion must, like every other impulse communicated, continue to diminish until it ceases altogether. If at the very time of the blow, the shock has not been forcible enough to produce alarming symptoms, such symptoms will not afterward come on when their cause is weakened. Hence the reason why compression can be distinguished from concussion of the brain, when there has been an interval of sense between the receipt of the blow and the occurrence of the bad symptoms. But the distinction of the symptoms into primary and consecutive cannot be made when concussion and extravasation exist together.

Having made these few remarks on concussion and compression of the brain, remarks which seemed necessary before I entered into a description of the operation of the trepan, I shall next premise some observations relative to contusions and fractures of the skull, cases on which the most erroneous opinions have been entertained. It is true, that I have in another place (see *Head, Injuries of*) considered the subject; but it may be better to recapitulate certain points here, because they have such immediate connexion with the application of the trephine.

Contusions of the head not unfrequently occasion a small kind of tumour which is soft in the centre, but hard and resisting at the circumference, especially when the violence has been considerable. Now the ease with which the centre or seat of the extravasated fluid admits of being depressed, while the circumference remains hard and elevated, is extremely apt to give rise to the belief, that a fracture with depression has happened. The true nature of this accident was first clearly explained by J. L. Petit, and since his time the proper cautions not to fall into a mistake concerning it, have been laid down by the generality of surgical writers.

Often nothing is more obscure, than the diagnosis of fractures of the cranium; their existence indeed can only be made out with certainty, when they can be felt or seen. Thus a fracture of the skull, attended with a wound of the scalp, and exposure of the bone, shows itself in the form of a fissure more or less wide and extensive, and taking various directions. The accident may also be known by the touch even when the soft parts continue entire, particularly if the fracture is accompanied with splinters, or the edges of the fissure are materially separated. When there are many splinters entirely detached, a crepitus will likewise serve to explain the nature of the accident; but unassisted by these symptoms, imparted to him by the sight, the hearing, or the touch, the practitioner cannot at once offer a decided opinion as to whether a fracture exists or not.

In order to procure more positive information, would it be right and judicious to make several incisions and uncover the bone? But here the surgeon would be embarrassed in the very commencement of his proceedings; for how would he be able to judge where the kife should be applied? Why also should he resort to an useless and painful operation, which (to say the best of it) could only render the patient's cure more distant?

The symptoms indicating compression of the brain, can alone justify an examination of the fracture. These symptoms also must be urgent and alarming; for when they prevail in a slight degree, bleeding and evacuations promise more benefit than any operation on the skull, and consequently all examination of the part supposed to be broken, must be unnecessary. The precept too commonly given, to cut through the scalp for the purpose of bringing the fracture into view, will no longer be matter of surprise, when it is known, that among some surgeons, the operation of the trepan is a thing of course in all fractures of the cranium.

Even when the cranium has been denuded, so that the sight can convey due information respecting the solution of continuity in the bone, care must be taken not to be deceived by a suture, or by the groove of a vessel. In cases of doubt, a modern surgical author advises us to scrape the outside of the bone; and he tells us, that if after the removal of the external scale, the fissure yet appear, and a thread of blood be seen at its outer part, no doubt exists of its being a real fissure. As however making this examination can answer no purpose, except with a view to determining the place where the trepan should be applied, I cannot recommend the plan, except where the symptoms are such as to render this information desirable. On the contrary, it appears to me, that all examinations of the bone, made seemingly from mere curiosity, and without any true surgical object, should be deprecated as rash and hurtful.

The danger of fractures of the skull does not depend upon the simple solution of continuity: it bears altogether a relation to the concussion and compression of the brain, with which the injury of the bone may be complicated. The pressure which is caused by depressed splinters of bone, is less alarming, inasmuch as the cause of the compression is easy of removal. The pressure arising from extravasated fluid is far more serious, in consequence of the difficulty of ascertaining positively the existence and precise situation of such extravasation.

The seat of the extravasation is sometimes between the skull and the dura mater, which has been detached from the bone. More frequently it occurs either between the dura mater and tunica arachnoides; in the substance of the brain; or else in the ventricles. The quantity of extravasated fluid is generally less in those extravasations, which are situated between the dura mater and the skull. The extravasations which are formed in the substance of the brain itself, are not only more considerable, but also, as they mostly depend upon concussion, are more alarming than effusions on the surface of the dura mater. It is indeed extremely difficult, if not impossible, to ascertain the situation of the extravasated fluid. In such cases the trepan is likewise of no use; while concussion, when so violent as to produce internal extravasation, is invariably fatal. In extravasations between the dura mater and the skull, which are almost the only cases of the kind to which surgery can administer relief, when the effused fluid lies under a part of the skull accessible to the trepan, the extravasated fluid is almost always small in quantity. The danger, however, is not the less: ten or twelve drops of fluid are sometimes enough to produce a fatal compression. When the extravasation has happened in the substance of the brain, the compression is far more perilous: in short, it may be said to prove with very few exceptions, certainly mortal. The danger is not so great, when the extravasation is situated between the skull and dura mater.

The lethargy, the degrees of which increase from mere drowsiness into the most perfect coma; and the paralysis of the opposite side of the body to the seat of the extravasation; are the characteristic symptoms of this accident in cases of injury of the head. Having explained elsewhere (see *Head, Injuries of,*) some other symptoms, such as stertorous respiration, dilated pupils, &c. which usually indicate pressure on the brain, it is unnecessary here to dwell upon them. The subsequent increase of the coma, and paralytic affections, and the gradual augmentation of their intensity, serve to render these symptoms distinguishable from others, which are suddenly brought on by concussion. But there are instances, as every man of experience knows, in which concussion ruptures the blood-vessels, and produces an extravasation of blood. In this circumstance, it is obvious that the symptoms of compression are blended with those of concussion. The symptoms proceeding from the latter cause always diminish in proportion to the time, which has elapsed from the moment of the injury; while those of compression succeed, and on the contrary, increase in intensity, in proportion as the quantity of extravasated fluid becomes more considerable. Notwithstanding these distinctions, however, it must be acknowledged, that there are many cases in which the surgeon is obliged to remain in doubt, with regard to the particular cause of the symptoms. This indecision is the more embarrassing, because the operation of the trepan is necessary in cases of extravasation, but useless in those of concussion. Even when extravasation is known to exist, the practitioner requires more information; for he ought to know the precise situation of the effused fluid. It is true, indeed, that paralysis of one side of the body generally indicates the pressure to be upon the opposite hemisphere of the brain. But what surgeon would venture to follow the practice advised by Van Swieten, and apply to the suspected side of the head three crowns of the trepan? Possibly not one of them might fall on the situation of the extravasated fluid. When the skull is broken, the extravasation exists on the same side as the fracture. When it is the effect of concussion, or when the breach of continuity in the skull is what is termed a counter-fissure; the effusion is generally on the side of the head most remote from the blow. If the pressure is caused by a detachment of the internal table of the skull, the nature of the case cannot be ascertained before the operation of the trepan has been performed on the part of the skull, upon which the violence has acted. When there are two extravasations; one depending upon a fracture, and situated immediately under it, between the dura mater and the skull; the other arising from concussion, and situated at some point directly opposite, either between the dura mater and tunica arachnoides, or within the substance of the brain itself; paralysis may occur on the same side as the fracture, and hence it may be inferred, that the palsy does not always take place on the side opposite to the extravasation. But, says Richerand, an examination of the body quickly proves, that the case does not deviate from the common rule. The extravasation produced by concussion, being almost invariably more considerable than that caused by a fracture, accounts for the extension of the palsy to the same side of the body. Sometimes the side which is not paralytic, is effected with convulsions; the pulse is full and hard; and the respiratio stertorous; in short, the symptoms are analogous to those caused by apoplexy.

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are much less common than many surgeons think. Even when they do occur, the dura mater is always detached to a certain extent, and, according to this writer, if the bone is much broken, the interspaces of the fragments are quite sufficient for the evacuation of the effused blood. The following case is quoted in proof of this observation. A woman injured her head by falling from a height of fifteen feet. The fracture reached the whole breadth of the skull, so that when the os frontis was taken hold of with one hand, and the os occipitis with the other, the two halves of the cranium admitted of being manifestly moved and separated. Blood issued from the fissure, the edges of which were kept apart by a small wedge of wood in such a manner, that the pulsations of the brain were visible. On the sixth day, as nothing was discharged from the fissure, the bit of wood was removed, and on the fifty-second the wound had completely healed without any exfoliations. On the seventy-second, the patient was discharged from the Hôtel-Dieu, perfectly cured. (*Nosogr. Chir. T.* 2, *p.* 292, *Edit.* 3.)

Thus we see, that the trepan is not always necessary in injuries of the head with fracture of the skull, notwithstanding there may be some degree of bleeding from the edges of the bone. This doctrine is very different from what is taught in the memoirs of M. Quesnay in the first volume of those of the French Academy of Surgery. Desault in the last years of his practice abandoned the operation of the trepan altogether. It had been remarked for many years, that, in the Hôtel-Dieu, this operation was almost always unsuccessful; a circumstance, which once excited a suspicion, that the foul air of the wards of that establishment might have a share in bringing on the unfavourable event. I shall not here expatiate on the bad effect of the atmospheric air on the membranes of the brain; a thing, of which B. Bell seems to have convinced Richerand.

When the skull is fractured by a blow, or fall, and the case is a simple fissure, the trepan ought to be applied upon the solution of continuity, *if the symptoms indicate a dangerous degree of pressure on the brain*, and the edges of the fracture are not sufficiently separated to let the extravasated fluid escape.

When the detached portions of bone are depressed, so as to compress the brain, the operation is still requisite, if they cannot be elevated by other means. But Richerand maintains, that a positive indication for trepanning is not frequent, either because it is difficult to judge of the existence and situaion of extravasations, or because extravaated fluids readily escape through the inerspaces of the fragments, when there is a plintered fracture. Such facility is also creased, when one of the portions of roken bone is totally detached, so that it n be removed, leaving an aperture equilent to what would be produced by the plication of the trepan.

When the operation is determined on, it is more convenient to have the head shaved: indeed, this is often done immediately the surgeon is called, in order that he may have a better opportunity of seeing what parts of the scalp have been struck; for it is in such situations that he has most reason to apprehend fractures of the bone, or extravasations beneath it. If, however, the violence has occasioned a large wound, or laceration of the scalp, the practitioner, knowing where the force has been applied, is frequently content with having a little of the hair shaved off the parts surrounding the injury. All that need be said on this subject is, that it is always better to have enough of the hair taken away, to afford the surgeon an uninterrupted opportunity of examining the scalp freely, and doing whatever may be necessary. The loss of a little hair is of very little consequence, while the concealment of the seat of a depressed fracture, or extravasation, might lead to fatal consequences.

When the propriety and necessity of trephining are fully indicated, provided the wound, or laceration of the scalp, should not have exposed a sufficient surface of the bone for the application of the crown of the trephine, an adequate dilatation of such wound ought immediately to be made. If, in the situation of the blow, there should only be a contusion, or a lump, unattended with any wound, a division of this part of the scalp is to be made by carrying the knife quite down to the bone. In those cases, in which the swelling occasioned by the violence is considerable, and attended with the sensation of a crepitus; as well as in other instances, in which there is only a contusion, under which a fracture and displaced pieces of bone may be felt; the scalp must be divided in the same manner, only with greater caution, lest the point of the knife should insinuate itself through the fracture, and do mischief to the dura mater and brain.

Authors recommend the shape of the incision to be different according to the kind of fracture, and the parts of the head, on which the violence has operated. When the whole extent of the injury can be brought into view, by means of an incision, having the form of a letter T, the surgeon should be content with such a division; but if this be not sufficient, he may give it a crucial shape. When the trephine is to be applied to the squamous part of the temporal bone, we are recommended to make the incision as much as possible, in shape of the letter V, the branches of which are to be upward, and the angle downward, in order that as little as possible of the temporal muscle may be cut, and that the division of its fibres may be avoided as far as it is in our power.

Having divided the scalp, the next object is to reflect it; but no man would be warranted in cutting any part of it away, although such practice is advised by Pott and many other eminent writers. The purposes of the operation do not require any removal of this kind; and the method would leave a wound, which would be long in healing, and when healed, never exempt from deformity. In short, the reflected flaps of the scalp are capable of adhering to the parts, on which they are laid after the operation, and consequently ought never to be wantonly cut away.

The scalp being reflected, authors next advise us to scrape away the pericranium, either with the knife, or the raspatory. Perhaps this measure may be considered as one, which does neither much harm nor much good. The design is to facilitate the application of the trephine to the bone. However, the teeth of a proper instrument, in good order, will not be impeded by the slender periosteum; and scraping this membrane away from parts of the skull, which are not to be removed, must be conducive to exfoliations.

Sometimes the bleeding from branches of the temporal, or occipital artery, is so copious, that the bone cannot be very conveniently perforated before the hemorrhage is suppressed. If it be prudent to wait a little, and the case (as it generally does) should be likely to be benefited by the evacuation of blood, it is as well to let the bleeding continue for a certain time. The surgeon may then just direct an assistant to put the end of one of his fingers on the mouth of the vessel, and proceed in the operation. In some cases the bleeding might be so troublesome, that it would be better to tie the artery at once.

All parts of the cranium do not admit of being trephined with equal convenience and safety. It has usually been set down by surgical authors, that the trephine cannot be applied below the transverse ridge of the os occipitis. There are some cases, however, which prove that such an operation may be safely done, and that we ought not in urgent circumstances, to be afraid of dividing the trapezius and complexus muscles, in order to be enabled to apply the trephine to the bone. (See *Hutchison's Case in Med. Chir. Trans. Vol.* 2, *p.* 104, *&c.*)

The majority of writers also forbid the application of the trephine to the frontal sinuses, in consequence of the indeterminate depth of these cavities, and the apprehension of incurable fistulæ. However, Larrey has deviated from this precept in several instances, and his practice confirms the statement of Mr. C. Bell, that, by opening the frontal sinus with a large trephine, and then using a small one, the internal parietes of this cavity may be trephined with perfect safety, and no risk of injuring the dura mater with the saw. (See *Larrey's Mém. de Chirurgie Militaire, T.* 2, *p.* 135—138, *T.* 4.)

Writers also caution us not to apply the trephine to the anterior inferior angle of the parietal bone, in consequence of the middle artery of the dura mater lying under it, generally in a groove of the bone, and occasionally in a canal in its very substance. In the latter circumstance, this portion of the parietal bone could not possibly be taken away, without wounding the vessel. However, notwithstanding this advice, which has been unthinkingly handed down by one writer to another, from generation to generation, I very much question the soundness of the doctrine. We undoubtedly ought to avoid trephining this part of the cranium, when we can prudently do so. But the causes demanding this operation are always so urgent, that the patient's sole chance of existence depends on their quick removal. Hence, were there pressure on the brain, either from a depressed portion of bone, from blood, or matter, and such pressure could not be removed without trephining the anterior inferior angle of the parietal bone, what operator would be afraid of doing so? Besides, the fear of the hemorrhage has been very unfounded; for the lodgment of the artery in a bony furrow, or canal, which authors have pointed out as rendering the suppression of the hemorrhage more difficult, is a mere visionary idea, as it is well known, that a little plug of lint pushed into the orifice of a vessel so situated, will always stop the bleeding, with as much certainty and ease as can possibly be imagined.

The foregoing suggestion was made in the early editions of my works, and I now see the safety of the practice has been confirmed. "I have also applied the trepan (says Larrey) over the track of the spheno-spinous artery, at the inferior anterior angle of the parietal bone. The artery was divided; but I stopped the hemorrhage almost immediately, by applying an iron probe red-hot." (*Mem. de Chir. Militaire, T.* 2, *p.* 138.)

Writers, until very lately, also prohibited us from trephining over any of the sutures, and especially over the sagittal suture, beneath which the longitudinal sinus is situated. The fear of the dura mater being injured, and of this vessel being wounded, was the reason for the advice. With regard to the sutures in general, the trephine may be applied to them, as well as to any other part; and as for the sagittal suture, many facts confirm the propriety of not being deterred even by it, though situated immediately over the longitudinal sinus. It is to be remembered, also, that the dura mater, in cases of extravasated blood and matter, beneath the cranium, is detached by the intervention of such fluids from the inner table.

By means of a perforation practised over the sagittal suture, Garengeot successfully elevated a portion of bone which pressed upon the longitudinal sinus, and made the patient ite comatose. The depressed piece of the cranium could not have been so advantageously raised, had the trepan been applied in any other situation. But a still stronger argument in favour of this practice, when the case at all requires it, is the fact, that wounds of the longitudinal sinus, and the hemorrhage resulting from them, are not attended with any serious danger. Sharp mentions his having twice seen a bleeding of this kind. Another instance is also recorded in Warner's Cases. A child received a wound on its forehead: the two parietal bones were fractured, and a portion of each was depressed on the dura mater. The child lived a month, without any operation being done; but at the end of this time, Warner applied the trepan. He found a splinter of bone sticking in such a way into the longitudinal sinus, that it could not easily be got out; consequently, he enlarged with a lancet the opening in which the splinter was entangled. The hemorrhage, which was copious, was easily suppressed by the application of a little dry lint, and the child was relieved, though it died at the end of two months, after suffering a variety of symptoms, which had no connexion with the wound of the sinus, the opening of which soon healed. The fourth case, related by Marchettis, also proves, that wounds of the longitudinal sinus are not fatal. Pott and Callisen have since recorded other facts, tending to the same conclusion. (See *Syst. Chir. Hodiernæ, Part* 1, *p.* 659, *Edit.* 1798.)

Whenever a depressed fracture can be elevated to its proper level, without applying the trephine, and with the mere aid of a pair of forceps, or an elevator, trephining should never be performed, unless there be strong reason to apprehend, that blood, or matter, lodged on the surface of the dura matter, contributes to the production of the bad symptoms, and ought to be discharged.

The scalp having been divided, if necessary, and the pericranium scraped from the surface of the bone, according to the common precepts and practice, the next thing is the application of the crown of the trephine.

The surgeon is first to make a little impression with the point of the centre-pin, for the purpose of marking the place where it will work, when the crown of the trephine is applied in the proper situation; for, where such impression is made, the operator must make a small hole with a perforator, in order to fix the point of the centre-pin, on which the crown of the instrument turns backward and forward, as on an axis, during the first stage of the operation. Mr. Savigny's centre-pins make a perforation, without the need of any particular instrument for the purpose, and, in this respect, are advantageous.

The point of the centre-pin having been fixed, the trephine is to be turned by regular semi-circular motions, alternately to the right and left, which object is effected by steady pronations and supinations of the operator's hand. The teeth of the saw having made a tolerable circular groove, in which they can steadily work, the centre-pin becomes useless, and, as it would, if not withdrawn, or removed, certainly injure the dura mater and brain, by reason of its projecting further than any other part of the instrument, it would be an unpardonable blunder to let it remain, after a proper circular groove has been formed by the teeth of the saw.

The beginning of the sawing may be executed boldly and quickly; for, the operator runs no hazard of doing mischief. It is necessary occasionally, with a view of facilitating the action of the instrument, to clean away the particles of bony matter, with a little brush, usually kept for the purpose in every box of trephining instruments. Were this plan neglected, the action of the cylindrical saw would be very much clogged.

The operator, however, must increase his caution, when the sawing has made greater progress; for, were he to be too bold, he might sometimes lacerate the membranes of the brain with the teeth of the instrument, particularly, as the thickness of the cranium is subject to infinite variety, both in different parts of the same head, and in different subjects. Let the surgeon, therefore, never forget to examine frequently with the point of a quill, whether any part of the circular groove is cut through or nearly so; for, when this is the case, the instrument must only be worked in such a way, as to make pressure upon, and cut, the part of the circle which yet remains to be divided. In some few cases, it is said, that the surgeon can distinctly feel, when the teeth of the saw reach the diploe, or medullary structure, between the two tables of the cranium, and some writers have rashly directed us to saw with boldness, till the sensation of this occurrence is communicated to our hand and fingers." However, I believe, this possibility of discriminating the arrival of the teeth of the saw at the diploe is so uncommon, and so fallacious, that it should never be expected, or relied on. Nor ought the surgeon to saw with incautious force and rapidity, till he sees the teeth of the trephine bloody, which appearance has been set down as another criterion of their having reached the diploe. I have already stated, that a great many skulls have hardly any space between several parts of the two tables. This is particularly often the case in old persons.

A prudent man will always prefer exerting a little force for the purpose of breaking some of the bony connexion, retaining the circular piece of bone, to running any hazard of injuring the dura mater, by sawing too deeply. After a certain time, therefore, it is better to lay down the trephine, and endeavour to elevate the portion of bone, with the aid of a pair of forceps, constructed for the purpose, and kept in most cases of trephining instruments, or else by means of an elevator, which is still more calculated for the purpose.

When the circular piece of bone has been taken out, and the edges of the perforation are unequal, and splintered, the irregularities are to be cut off with the lenticular knife. When there is extravasated blood underneath the opening which has been made, it sometimes spontaneously makes its escape, and, if it should not do so, the surgeon must remove it himself. If one perforation of the skull should not suffice for letting out the blood, as much more of the cranium ought to be removed with the trephine, as circumstances may require; there being no comparison between the danger of repeating the application of the instrument, and that of leaving a quantity of undischarged, compressing fluid, on the surface of the brain. Certainly, many facts on record evince, that the dura mater may be very extensively uncovered, without dangerous consequences. Sarrau saw a whole parietal bone exfoliate, in consequence of a blow on the head. Blegny relates a similar case; and Saviard makes mention of a woman, who had lost the upper part of the os frontis, both the parietal bones, and a large portion of the os occipitis, all of which had come away at the same; yet she recovered. Vaugion, however, who also seems to relate this identical case, describes the exfoliation as not being quite so extensive.

I am of opinion, notwithstanding these facts, that exposing a large part of the dura mater with the trephine is, by no means, an operation exempt from serious danger. And, what I conceive confirms this statement, is my having known instances, in which persons, who had been rashly advised to submit to being trephined, for the cure of violent pains in the head, &c. died, in consequence of the operation. I make this observation, well aware of the successful instance of the practice recorded by Schmucker. (*Wahrnehm. B.* 1, *p.* 434.)

However, I perfectly coincide with writers, who direct the removal of as much bone, as is necessary in order to be able to remove the whole of the pressure from the surface of the dura mater.

The application of the trephine, in cases of large extravasations, must in particular be made several times, when the situation of the fluid does not favour its escape. However, in this circumstance, Sabatier says, that we should not make numerous perforations all along the extent of the extravasation; but, only a counter-opening, as is done on the soft parts. This author expresses his surprise at there not being on record many examples of counter-openings made in the cranium, since analogy demonstrates their utility. I cannot help remarking on this part of the subject, that one very obvious objection to make openings of this kind in the cranium, is the impossibility of knowing with certainty, whether blood lies under any particular part of the skull; whereas, in abscesses of the soft parts, the surgeon feels the fluctuation of the matter, and knows that his counter-opening will be made in the cavity containing it. One might also have occasion to make more than one perforation, in order to discharge blood extravasated beneath the skull, when the blow has happened near a suture, to which the dura mater continues adherent; for, a single opening made only on one side of the suture, might only give vent to a part of the extravasation.

If we should not find blood lodged under the cranium; but the dura mater should seem elevated, tense, dark-coloured, forming a prominent fluctuating tumour, outward, it may be cautiously opened with a lancet, or bistoury, with a view of letting out any collection of blood underneath. In the article *Head, Injuries of*, I have stated the result of Mr. Abernethy's experience, in regard to the operation of opening the dura mater. This gentleman found, that the method never effectually discharged all the blood, but only the serous part of it. The evacuation of any of the compressing fluid must, however, be desirable; and, if the surgeon cannot do more, yet he has fulfilled his professional duty.

The utility of trephining is not limited to discharging extravasated blood, or matter, lodged underneath the skull. This operation frequently enables us to elevate depressed portions of bone. The latter object can often be accomplished by merely making one perforation. Sometimes, several perforations are requisite to be made near each other. Authors even state, that it may also become necessary to remove the intervening portions of bone with a pair of cutting forceps. The depressed part may then be easily raised by means of an elevator. Occasionally, indeed, I may say very often, the best practice is to remove the depressed portion entirely, when its total separation from the rest of the skull can be accomplished by cutting across the base of the depressed piece. If any splinter stick in the dura mater, and should not admit of being withdrawn, without enlarging the wound in the membrane, the surgeon ought not to be afraid of doing this with a sharp instrument.

According to some quick-inferring writers, if, after dividing the dura mater, the surface of the brain appears smooth and flabby, with a fluctuation, we may conclude there is an abscess in its substance; and these authors, more enterprising with their pens, it is to be hoped, than with their scalpels, sanction the method of carrying the point of the bistoury to the depth of an inch, *if circumstances render so deep a puncture necessary.* "But," says Richerand, "prudence forbids us to go further. Cutting the surface of the brain causes no pain, and it produces less danger, than one might apprehend; but, experience and observation have proved, that the essential parts of this organ are situated near its base, and that *its surface may be removed without danger, or pain.*" (*Nosogr. Chir. T.* 2, *p.* 301, *Edit.* 3.)

After the operation of trephining, the divided scalp is to be placed as nearly as possible in its natural situation, and lightly dressed with a simple pledget of any common unirritating ointment. In applying the dressings, the surgeon should invariably keep in view these objects; namely, to let whatever is put on the wound be as light as possible, not apt to make pressure on the brain, and of a nature, which cannot excite irritation. All stimulants are to be strictly avoided; nor will any bandage be better than an ordinary night-cap of sufficient size to be put on with facility. It may be secured with bits of tape, which are to be tied under the jaw.

The practitioner should not now conceive, that he has done all that he ought to do. Let him remember the urgent necessity of keeping off, or diminishing, the inflammation of the dura mater and brain, which is still to be feared. Let him bleed the patient largely and repeatedly; exhibit saline purges, glysters, and antimonials; and if the symptoms continue, let him apply a blister to some part of the head. I shall avoid, however, any repetitions on this subject, by referring to *Head, Injuries of.*

The aperture in the skull usually becomes closed with soft granulations, which slowly acquire a hard consistence. These almost constantly grow from the edge of the perforation, and seldom from the surface of the dura mater. While the cicatrix is soft, it should be protected from external injury with a thin piece of horn, or metal. Exfoliations from the margin of the perforation sometimes retard the healing of the wound; but, now that the practice of dressing with drying spirituous applications has been exploded, and the removal of any part of the scalp is condemned by all the best surgeons, these unpleasant consequences are rendered much less frequent, than in former days.

The reader may find an account of the operation of trepanning, or trephining, in every system of surgery; but, he should particularly consult the writings of Sharp, Le Dran, Dionis, Bertrandi, Pott, Sabatier, Schmucker, Abernethy, Desault, Callisen, Richerand, &c. Several parts of the Mémoires de l'Acad. de Chirurgie are also highly deserving of perusal

TRICHIASIS, (derived from ϑριξ, the hair) denotes a faulty inclination of the eyelashes inwards against the globe of the eye. According to Scarpa, the disease presents itself under two distinct forms: the first is, where the cilia are turned inwards, without the natural position and direction of the tarsus being at all changed; the second consists in a morbid inclination of the tarsus inwards, (*Entropium*) and consequently of the eyelash towards the eyeball. (*Trichiasis.*)

The first form of this disease is said both by Beer and Scarpa to be uncommon, nor has it come under the observation of the latter writer more than once, and, in this instance, only some of the hairs had changed their direction. On this point, however, Mr. Travers is completely at variance with the foregoing authors, as he describes an inversion of the cilia as *frequently* existing independent of entropeon. (*Synopsis, p.* 232.) The second species, or form of trichiasis, or that which consists in a folding inwards of the tarsus and cilia at the same time, is the case which is commonly met with in practice. It may be either complete, affecting the whole of the tarsus; or incomplete, occupying only a certain portion of the edge of the eyelid, most frequently near the external angle of the eye. Sometimes, the disease is confined to one eyelid; at other times, it affects both; and occasionally the patient is afflicted with it in both eyes.

Some writers, among whom is Beer, (*Lehre von den Augenkr. B.* 2, *p*. 118.) admit a case, which they call *distichiasis*, and which they suppose to be produced by a double and unusual row of hairs. But according to Scarpa, this third species is only imaginary, and the reason of such subdivision seems to have arisen from not recollecting, what was long ago remarked by Winslow and Albinus, that although the roots of the cilia appear to be disposed in one line only, they form two, three, and in the upper eyelid even four rows of hairs, unequally situated, and as it were confused. Whenever, therefore, in consequence of disease, a certain number of hairs are separated from each other in a contrary direction and disorderly manner, the eyelash will appear to be composed of a new and unusual row of them, while, in fact, there is no change, either with respect to their number, or natural implantation.

It is not an easy matter to determine precisely, says Scarpa, what are the causes, which sometimes make a few of the hairs deviate from their natural direction, while the tarsus continues in its right position. They are commonly referred to cicatrices in consequence of previous ulceration, whereby the cilia fall off, and those which are growing are hindered from taking their proper direction. There must, however, be other causes sometimes concerned; for, in the case seen by Professor Scarpa, two or three hairs were turned inwards against the eyeball, although there had been no preceding ulceration, nor cicatrices, of any part of the tarsus. Indeed, Scarpa is inclined to believe, that the small ulcers and scars, which are sometimes formed upon the internal margin of the tarsus, are more likely to cause the second form of the disease, or the inversion of the edge of the eyelid, and, consequently, of the cilia towards the globe of the eye. As these ulcers, when neglected, destroy the internal membrane of the eyelids near the tarsus, it necessarily follows that, in proportion as they heal and diminish, they draw along with them and turn inwards the tarsus, and hairs inserted into it. And since they do not always occupy the whole extent of the internal margin of the eyelid, but are sometimes confined to a few lines, in the middle, or extremity, near the external angle of the eyelid, so after the cicatrices are formed, the whole of the hairs are not invariably turned inwards, but only a certain number of them, which correspond to the extent of the ulcers previously situated along the internal edge of the tarsus. Indeed, in every case of imperfect trichiasis from a cicatrix of the inner margin of the eyelid, the tarsus and cilia are every where in their natural situation, except opposite the part, where the ulcers formerly existed. Also, if the eyelid be everted, its internal membrane, near that part of the margin corresponding to the seat of the trichiasis, will be found pale, rigid, and hardened, the inversion of the cartilaginous border and of the cilia being plainly the effect of the contractions of the cicatrized point.

Chronic ophthalmies of long continuance

sometimes bring on the complaint, in consequence of the skin of the eyelids being kept for a long time in a state of distention and œdema, terminating in a considerable relaxation of it. And, according to Beer, the too long continued use of emollient poultices may have the same effect. (*Lehre, &c. B.* 2, *p.* 113.) The cartilaginous margin of the eyelid then loses the proper support of the integuments, inclines towards the eyeball, and afterward turns inwards, drawing the eyelashes along with it in the same improper direction. Long-continued puriform discharges from the ciliary glands likewise spoil the shape and consistence of the cartilage of the eyelid, and therefore not unfrequently occasion trichiasis. Scarpa doubts, whether a spasmodic contraction of the orbicularis palpebrarum muscle can ever be a cause of the disease.

The annoyance, which must necessarily result from the hairs perpetually pressing upon the cornea and white of the eye, as Scarpa observes, may be easily imagined. The evil is rendered still greater by the hairs, which are turned inwards, becoming much longer and thicker, than those which retain their natural direction. And although the trichiasis be confined to one eye, both the eyes usually suffer from the effects of the disease. Indeed, generally, the eye on the sound side cannot be moved without occasioning pain in that which is exposed to the irritation and friction of the inflected hairs. In almost all instances, both the eyes are very irritable, and incapable of bearing the light. As, in cases of incomplete trichiasis, the patient retains some little power of opening the eyelids for the purpose of seeing, and that most frequently towards the internal angle of the eye, the head and neck are often inclined in an awkward manner, so that in children a distortion of the neck and shoulders is at last produced, which cannot be rectified without difficulty, even after the trichiasis is cured. Unfortunately, also, children are impatient of the uneasiness arising from the inflected hairs, and, therefore, are continually rubbing the eyelids, whereby all the ill effects of the complaint are much increased.

The cure of the second species of trichiasis, or that which is commonly met with in practice, is accomplished by artificially everting the eyelid, and fixing it permanently in its natural position, together with the eyelashes, which irritate the globe of the eye. According to Professor Scarpa, this indication is perfectly fulfilled by the excision of a piece of the skin close to the edge of the eyelid, of such a breadth and extent that, when the cicatrix is formed, the tarsus and margin of the eyelid may be turned outwards, and sufficiently separated from the eyeball, the cicatrix of the integuments affording a point of support fully adequate to keeping the parts in their natural position and direction. Scarpa believes, that there are now very few modern surgeons, who, with a view to the radical cure of this disease, place any confidence either in plucking out the inverted eyelashes, bending them outwards, and retaining them so by means of adhesive plaster; or in plucking them out, and destroying their roots with caustic: much less in extirpating the edge of the eyelid along with the hairs, or dividing the orbicularis muscle on the internal surface of the eyelid, under an idea that the disease is sometimes produced by a spasmodic contraction of it.

The following is the mode of proceeding recommended by Scarpa. The patient being seated in a chair, if an adult, or, if a child, laid upon a table, with the head raised, and firmly held by an assistant, who must stand behind the patient; the surgeon is to push outward, with the end of a probe, the hairs, which irritate the eye. Then, with a pair of dissecting forceps, or the ends of his fore-finger and thumb (which answer equally well, and in many cases much better, than forceps,) the operator should lift up a fold of the skin of the affected eyelid, taking great care that the piece which is taken hold of corresponds exactly to the middle of the whole extent of the trichiasis; for sometimes the whole, sometimes a half, and, in other instances, only a third of the extent of the tarsus is inverted. The surgeon, with his left hand, must raise the fold of the skin, more or less, according as the relaxation of the integuments, and the inversion of the tarsus, are more or less considerable. The reason of this is evident, viz. the greater the quantity of skin is which is raised, the greater is the quantity which will be cut away. Supposing the patient to be an adult, as soon as the fold of skin has been raised in a certain degree, the surgeon must request him to open his eye, and if in this act the tarsus and eyelashes resume their natural place and direction, the portion of skin already raised will be sufficient for the purpose. When the integuments are elevated, by means of a pair of dissecting forceps, and care is taken to lay hold of the skin precisely at the middle point of the whole extent of the trichiasis, it necessarily follows, that the consequent section of the skin will form an oval, and that the greatest width of the wound will correspond exactly, or nearly so, to the middle of the eyelid, and its narrowest parts to the angles, or commissures of the same. This contributes very materially to make the cicatrix correspond to the natural fold of the eyelid, and hinder the origin of a disease of an opposite nature to the one about to be remedied, towards the angles of the eye, viz. a turning out of the commissures of the eyelids. See *Ectropium.*

Besides this caution, relative to the situation and figure of the fold of the integuments to be cut off, the surgeon must be careful that the division of the skin be made very near the inverted tarsus. Were this circumstance neglected, the operator might have the mortification of finding after the wound is healed, that although the eyelid is shortened on the whole, from the eyebrow to the place of the recision, yet it is not equally so at the space which is between the edge of the eyelid and the cicatrix of the skin. Hence the tarsus would not be turned outward sufficiently to keep the eyelashes from rubbing against the eye.

The surgeon holding up the fold of skin by means of the forceps in his left hand, is with a pair of probe-pointed, sharp-curved scissors, to cut off the whole of the duplicature, being first sure that one of the blades of the instrument is applied close to the edge of the eyelid. If the eyelids should be affected, the same operation must immediately be done upon both of them, with such cautions, and in such proportion, as the extent of the disease, and the degree of inversion of each eyelid may require.

Scarpa next dissuades us from employing any suture to unite the wound, and represents that it will be sufficient to keep the eyebrow as much downward as possible, if the operation has been done on the upper eyelid, or if on the lower, to support it against the inferior arch of the orbit, by pressing it from below upwards, so as to keep the edges of the wound from becoming separated. Then the lips of the wound are to be brought exactly together by means of adhesive plaster, which should extend from the superior arch of the orbit to the zygoma, and the maintenance of this state of the wound will be still more securely effected, by placing two compresses, one on the eyebrow, and another on the zygoma, together with a bandage. On the other hand, Langenbeck disapproves of the omission of sutures, by which he finds that the wound may be both more accurately and expeditiously united. Indeed, he expresses himself generally in favour of sutures, where the wounded part is liable to be disturbed by the continual action of the muscles. (*Neue Bibl. B.* 1, *p.* 415, *&c.* 12*mo. Hanover*, 1818.) Langenbeck, however, takes care to withdraw the ligatures in about twelve, or at most twenty-four hours, as their longer continuance would produce suppuration. Beer also particularly insists upon the utility of bringing the edges of the incision together with a suture; and both he and Langenbeck employ forceps, the ends of which have transverse pieces, calculated to take better hold of the slip of skin to be removed. (*Lehre, &c. B.* 2, *p.* 114.)

On taking off the first dressings, the third day after the operation, the surgeon will find, says Scarpa, that the patient can open his eye with ease, and that the inverted tarsus and eyelashes have resumed their natural position and direction. In the partial or incomplete trichiasis, or that which only occupies a half, or a third of the whole length of the tarsus, and in subjects who have had the skin of the eyelids very loose, Scarpa has often found the wound perfectly united on removing the first dressing.

When, however, only a part of the incision has healed, while the rest seems disposed to heal by suppuration and granulation, the surgeon is to cover the wound with a small piece of lint, spread with the unguentum cerussæ; and if the sore should become flabby, it must be occasionally touched with the argentum nitratum, until the cure is finished.

With regard to the first form of this disease, or that in which the eyelashes project against the eyeball, without the natural position of the tarsus being at all altered, (a case which is fortunately rare) the accomplishment of a cure is very difficult, since neither the pulling out of the hairs, nor burning the situation of their roots, are means at all to be depended upon for producing a complete cure of the disorder; and turning the tarsus out of its natural position would make the patient liable to an irremediable dropping of the tears over the cheek, attended with a chronic thickening of the lining of the eyelid. It has only been in youngish individuals that Beer has ever seen the repeated and careful extraction of the cilia effect a radical cure. (See *Lehre von den Augenkr. B.* 2, *p.* 121.) In the instance of this form of the disease, which Scarpa met with, only two or three of the eyelashes inclined against the eyeball. He found, on turning the eyelid a little out, opposite to the situation of the faulty hairs, that he could not, indeed, completely put them in their natural position; but he saw that he could thus remove them so far from the cornea that they would not rub against it without altering the position of the eyelids so much as to occasion a perpetual discharge of the tears over the cheek. And, as in the patient alluded to, the skin about the eyelid was very tense, Scarpa made an incision with the back of the lancet, near the tarsus, three lines long, and took away a small piece of skin of the same length, but very little more than one line broad. When the cut healed, the operation was found to answer as well as the nature of the case would allow, though the cure was not complete.

The trichiasis being cured, something more always remains to be done for the purpose of correcting the cause of the disease, as well as curing the disorder of the eye, occasioned by the previous friction and irritation of the inverted hairs. The usual indications are to restore the tone of the vessels of the conjunctiva, to lessen the swelled Meibomian glands, and obviate opacity of the cornea.

Some new methods of performing the operation for the cure of trichiasis, have been proposed by Dr. Crampton, Mr. Saunders, and Schreger.

The following is the account which Dr. Crampton gives of his plan, which he tried in one instance with complete success. "Let the eyelid be well turned outwards by an assistant; let the operator then, with a lancet, divide the broad margin of the tarsus completely through by two perpendicular incisions, one on each side of the inverted hair or hairs; let him then, by a transverse section of the conjunctiva of the eyelid, unite the extremities of the perpendicular incisions. The portion of cartilage contained within the incisions, can then, if inverted, with ease be restored to its original situation, and retained there by small strips of adhesive plaster, or, perhaps what is better, by a suspensorium palpebræ, adapted to the length of the portion of the tarsus, which it is intended to sustain, should one or two hairs be displaced without inversion of the tarsus." (*Essay on the Entropeon, p.* 55.)

Mr. Travers informs us, that, in cases of a circumscribed inversion, "produced by cicatrix from burn or wound," he has found Dr. Crampton's method an effectual remedy. It is added, that the complete division of the conjunctiva and tarsal cartilage, including the inverted portion, and parallel to its border, with the aid of sticking plaster, sometimes proved sufficient. Mr. Travers also sees no objection to the entire removal of that portion of the tarsal edge which is incorrigibly inverted from such a cause, especially when combined with a preternatural growth of cilia from the Meibomian border of the tarsus. (*Synopsis, &c. p.* 356.) In one inveterate case, which was not effectually relieved by the frequent extraction of the cilia, cauterizing the edge of the tarsus, the excision of a slip of skin, and smearing the eyelid with concentrated sulphuric acid, as proposed by Helling, (*Hufeland's Journ. St.* 4, *p.* 115) Schreger, with a pair of curved scissors, cut out a triangular piece of the cartilage of the eyelid at the place where the cilia were most troublesome. The great benefit derived from the operation then led the same practitioner to suggest the removal of the whole of the inverted edge of the tarsus, towards the inner canthus, where some irritation was yet maintained. The plan, though followed by severe pain, appears to have succeeded. (*Chir. Versuche, B.* 2, *p.* 253.)

Mr. Saunders entertained a favourable opinion of Dr Crampton's operation for the cure of the disease in its early stage; but, he contended, such a vicious bending of the tarsus inward was often the consequence of repeated ophthalmy, attended with ulceration of the conjunctiva and inside of the eyelid, so that every endeavour to rectify the wrong position of the tarsus, and restore its original direction, would be fruitless. Hence he believed that its excision was decidedly indicated; an operation which is said to be followed by no pain nor uneasiness, and which is sure in its effect. No particular shortening of the eyelid ensues; the deformity is materially lessened; and, unless the cornea be already too opaque, perfect vision is re-established. Mr. Saunders directs a piece of thin horn, or a plate of silver, having a curvature corresponding to that of the eyelid, to be introduced under this part, with its concavity towards the eyeball. On this instrument the eyelid is to be stretched. An incision is to be made through the integuments and orbicularis palpebrarum down to the tarsus, immediately behind the roots of the cilia. The cut should extend from the punctum lachrymale to the external angle. The exterior surface of the tarsus is then to be dissected until the orbital margin is exposed, when the conjunctiva is to be cut through directly by the side of the tarsus, which must now be disengaged at each extremity. The punctum lachrymale must be left uninjured. The operation is described as being simple, and if any embarrassment arises, it is from the hemorrhage of the ciliary artery, the blood sometimes obscuring the punctum lachrymale, just when the operator is about to divide the tarsus by the side of it. No dressings are required, it being merely necessary to keep the eye covered for a few days. The skin will continue to be elevated, just as the perfect eyelid was; and, though less completely, yet enough to leave the pupil clear when the eye is moderately directed upward. In all the cases in which Mr. Saunders operated, a fungus grew from the wound. He recommends the excrescence to be destroyed with caustic or the knife.

Respecting this operation I shall merely observe, that it is more severe than that advised by Professor Scarpa, and even than the method of Schreger, and must leave greater disfigurement. Unless, therefore, the latter methods prove ineffectual, I should consider the practice unjustifiable. Nor is Schreger's method allowable, except in cases which resist the milder plan, sanctioned by Beer, Scarpa, and all the best practitioners in ophthalmic surgery.

Inversion of the lower eyelid is much less common than that of the upper one. The late Mr. Saunders never saw this disease arise from the same causes which induce it in the upper eyelid, though he acknowledges the possibility of such a case. However, he met with several instances of the affection, in consequence of encysted tumours, which, as they increased, carried the orbital edge of the tarsus outwards, and, in the same proportion, inclined the ciliary edge towards the globe of the eye.

An inversion of the inferior palpebra is sometimes produced by inflammation and swelling of that part of the conjunctiva which connects the eyelid with the eyeball. In cases of ophthalmy this membrane often forms between the latter parts a distinct fold, which is situated just on the inside of the orbital edge of the tarsus, and pushes it outward; while the contraction of the orbicularis muscle turns the ciliary edge inwards, and inclines it between the swelling of the conjunctiva and the eye. In this particular case, Mr. Saunders assures us, that replacing the eyelid in the early stage of the disease, and maintaining it so until the ophthalmy has been lessened by proper means, will be found effectual. But when the conjunctiva is much thickened and indurated, Mr. Saunders recommends cutting such diseased part of it away, and the application of compresses to keep the orbital margin of the tarsus inward. (See also *Travers's Synopsis, p.* 234 *and* 355.)

Albinus has recorded a species of trichiasis which originated from the growth and inversion of one of the hairs upon the caruncula lachrymalis. The plan of relief consisted in plucking out the irritating hair; but it is not mentioned whether the hair grew again.

J. Scultetus, Trichiasis Admiranda, sive Morbus Pilaris Mirabilis, 12*mo. Norib.* 1658. *Scarpa sulle principali Malattie degli Occhi. R. Crampton, Essay on the Entropeon, Lond.* 1805. *Saunders's Obs. on several practical Points relative to the Diseases of the Eye, Edit.* 3. *Richter's Anfangsgründe der Wundarzneykunst, B.* 3. *G. J. Beer, Lehre von den Augenkrankeiten, B.* 2, *p.* 111—117, 8*vo. Wien.* 1817. *Schreger, Chirurgische Versüche, B.* 2. *Neue Methode die Trichiasis zu Operiren, p.* 253, 8*vo. Nürnberg.* 1818. *B. Travers, Synopsis of the Diseases of the Eye, p.* 232—354. *&c.* 8*vo. Lond.* 1820.

TRISMUS. (from τριζω, to gnash the teeth.) The locked jaw. See *Tetanus.*

TROCHAR, or TROCAR. (from the French, *trois-quart*, three-fourths, from its point being of a triangular form.) An instrument used for discharging aqueous fluids, and now and then, matter from different cavities in the body, particularly those of the peritoneum, and tunica vaginalis, in cases of ascites and hydrocele. Trocars are also employed for tapping the bladder, dropsical ovaries, &c.

A trocar consists of a perforator, or stilette, and of a cannula, which latter is so adapted to the first piece of the instrument, that when the puncture is made, they both enter the wound together, with perfect ease, after which the stilette being withdrawn, the cannula remains in the wound, and gives a ready passage for the fluid outward.

Such are the uses of a trocar, and the principles on which it should be constructed. It would be unnecessary in this work to detail every little particularity in the instrument. I shall merely observe, that the triangular-pointed trocars seem to retain the greatest share of approbation; for, although those of a flat, lancet-pointed shape enter parts with more ease, their cannulæ are not large enough for the ready escape of fluids which are at all thick, gelatinous, or blended with hydatids, and flaky substances.

The trocar for puncturing the bladder from the rectum, should be longer than a common trocar, and of a curved form; but as Mr. Carpue has explained, it should not be passed too high up the rectum, lest the peritonæum be wounded.

Surgeons ought always to have, at least three trocars; one of full size, another of middling width, and a third of small dimensions. In cases of hydrocele, the latter is often preferable.

*TRUSS. (*trousse*, French.) *Bracherium.* A bandage, or apparatus, for keeping a hernia reduced. A truss, which fulfils its intention properly, should compress the neck of the hernial sac, and the ring, or external opening of the hernia, in such a manner, that a protrusion of any of the contents of the abdomen will be prevented with complete security. Hence, it is the indispensable quality of a good truss, first to make effectual and equal pressure on the parts indicated, without causing pain, or inconvenience to the patient; secondly, not easily to slip out of its right situation, in the varying motions and positions of the body.

Trusses are either of an elastic or non-elastic kind. The latter are composed of leather, fustian, dimity, or similar materials. These cannot be at all depended on, and should, therefore, be entirely banished from surgery. Since, (as Mr. Lawrence has remarked) the size of the abdomen varies, according to the different states of the viscera, and to the motions of its parietes in respiration, a non-elastic bandage must vary constantly in its degree of tightness, and keep up either too great, or too little pressure. The omentum, or intestine, easily slips out when the opening is not exactly closed, and the patient who wears such a bandage must be in a state of constant insecurity. Those who lead an active life, or are obliged to use laborious exertions, will be more particularly exposed to risk. If the patient, after experiencing these defects, endeavours to remedy them by drawing the bandage tighter, he may confine the viscera, but he produces other inconveniences. The increased pressure injures the spermatic chord, and may affect the testicle: the integuments become red, painful, and excoriated; and the bandage must be entirely laid aside, until the parts have recovered. Richter has often seen painful tumefaction of the testicle, hydrocele, and even cirsocele, produced from this cause, and entirely dissipated by the employment of a proper truss. (*Traité des Hernies, p.* 24.) He also saw the pad of a non-elastic bandage excite, in the region of the abdominal ring, a considerable inflammation, which terminated after a few days in suppuration. The hernia never appeared again after the cure of the abscess. The inflammation had extended to the neck of the sac, and obliterated that part.—(*Lawrence on Ruptures, Edit.* 3, *p.* 69, 70.) The *spring* is a very essential part of every elastic truss, and it consists of a flat long piece of steel, which is adapted to the side of the body, on which the hernia is situated. It is not a great many years since the spring used to be made of common iron, and Arnaud and Richter express their preference to a mixture of malleable iron and steel, so that the instrument may be moulded by the hand to any particular shape; but, as Mr. Lawrence well observes, a truss, which admits of such management, must be more or less liable to the objections which apply to inelastic bandages, and the only material, which possesses the requisite qualities of firmness and elasticity, is well-tempered steel. The front part of the steel spring has an expanded form, and, when the truss is properly applied, ought to be situated over the mouth of the hernial sac. The spring of a truss has commonly been a semicircle, with the posterior end resting on the spine. Camper proposed to carry it round to the anterior superior spine of the ilium on the sound side; a plan, of which Scarpa highly approves. Trusses of this form fit with a degree of steadiness, which cannot be given to others, by tightening the strap. They keep up the rupture better than even a stronger spring of the common kind. Under the back surface of the anterior end of the spring is placed the pad, which should be adapted in shape and size to the passage, which is intended to be shut up. The steel spring is usually covered with leather, is lined with soft materials, and after being put on the patient, is fastened in its situation by means of a strap, which extends from the two ends of the spring, round that side of the body, on which the hernia is not situated. Hareskin, with the fur outwards, is sometimes considered the best covering for preserving the spring from the ill effects of perspiration.

When it is necessary to make strong compression, as in large old ruptures, and in persons who cannot avoid labour and exercise, the elastic spring should be made accordingly thicker and broader. But, an object of the first-rate importance is to make the spring press equally upon every point of the body which it touches. This is what demands the earnest attention both of the surgeon and the instrument-maker, especially as the hips of some individuals are flat and narrow, while those of other persons are broad and prominent. A thick, flexible, metallic wire, accurately applied round the pelvis, will serve to take the measure and proper shape of the spring, which may afterward be altered a little if found necessary. The wire, however, should be somewhat longer, on account of the length of the spring.

The springs of trusses intended for children, and persons who do not undergo much labour and exertion, need not be made so strong as those designed for hard-working, active people.

The idea, that children cannot wear steel trusses, is as erroneous as it is dangerous in its practical consequences; a point, on which Mr. Pott has strongly insisted.

Trusses are sometimes fabricated with a pad moveable on the spring, instead of being riveted to it. This may be inclined upwards, or downwards, according to the form of the abdomen; and it is retained at the desired point by a spring fitting into the teeth of a rack. In others, the plate contains a screw, by which the cushion is pushed further inward, or allowed to recede at pleasure. Although there cannot be a doubt, that some of these inventions possess considerable merit, and are in certain instances superiorly useful, it must be confessed, that, in general, their utility is not so much greater, than that of common pads, as to make amends for the want of simplicity and the increase of expense. I should be sorry, however, to say any thing that would unfairly discourage all such ingenious endeavours to improve an instrument so difficult to bring to perfection as a truss; especially as I believe there are particular cases, in which pads, with racks, screws, springs, &c. may be employed with great advantage.

Notwithstanding every care, sometimes even elastic trusses cannot be hindered from slipping away from the part, which they are designed to compress. Sometimes they slip downwards, which in fat subjects is generally caused by the projection of the abdomen. Occasionally, the fault consists in the instrument becoming displaced in the direction upwards, which mostly happens in thin persons, and is produced by the flatness of the abdomen. In the first case, the displacement is to be prevented by the use of an elastic scapulary; in the second, the slipping of the pad upwards is to be prevented by the employment of a thigh strap.

When a patient is afflicted with a rupture on each side. the two protrusions may be very well kept up by means of a single truss, made with two pads, which are joined together, at the exact distance of the rings from each other, by a piece of steel, applied over the convexity of the symphysis of the pubes, and proportioned in length to the space between the two openings, through which the viscera descend. In such cases, however, it is absolutely necessary to have the spring stronger, than if there were only one rupture. The truss should also be put on that side of the body, upon which the hernia most difficult to retain is situated. There are some practitioners, however, who give the preference to the use of two single trusses, joined together in front and behind with suitable straps.

With respect to the application and use of trusses, the following instructions seem to merit attention.

1. A truss should never be first applied, or changed, except when the patient is in the horizontal posture, and it is known, with certainty, that all the contents of the rupture are completely reduced.

2. The first applications of a truss should always be made under the superintendency of the surgeon himself; and care should be taken to put on the instrument in such a manner, that the lower third of the pad will compress the neck of the hernial sac against the os pubis, while the upper portion will compress the abdominal ring. The surgeon should also make the patient acquainted with the right manner of applying the truss; the principles on which it keeps up the bowels, and affords a chance of a radical cure; the requisite cautions to be observed, &c. When a patient first begins to wear a truss, he should be particularly careful not to be guilty of any imprudent exertions, and it behoves him to observe most attentively, that the instrument does not slip from its proper situation. It will also be necessary for him to pay attention to the instrument being neither too tight, nor too loose.

3. The patient ought to be provided with at least two trusses, which should be changed every morning in bed. In order to save the truss, especially in fat persons who perspire a great deal, it is a good plan to lay a soft piece of calico under the pad.

4. An uneasiness about the ring, which always gives rise to a suspicion that a portion of intestine, or omentum, is protruded, makes it proper to take off the truss, carefully examine the parts, and reduce them if they have descended.

5. When the skin is excoriated by the truss, the part may be cured by sprinkling upon it the powder of acetite of lead, Fuller's earth, lapis calaminaris, &c. or bathing the part with an astringent lotion. It will also be right to protect the excoriated place with a piece of linen put under the truss.

6. When the pressure of the truss excites affections and swellings of the spermatic chord and testicle, either the thigh strap must be relaxed, or the lower part of the pad made less prominent. And when strong pressure is absolutely necessary to keep the hernia reduced, the pad should have an excavation in it over the spermatic chord. Whoever wears a truss should be careful to employ it day and night, without interruption, so that there may be no opportunity for the hernia to protrude again. If under the employment of a truss, the rupture once descends again, either a strangulation happens from the narrowness of the neck of the sac; or, at all events, the hope of a radical cure, which may have been entertained for years and months, is destroyed in a moment; for, experience has put it beyond all doubt, that, by the continual unremitted use of a truss, and the steady retention of the contents of the hernia, the neck of the hernial sac, and the ring, may be gradually lessened in diameter, until they are entirely closed, and a radical cure of the rupture effected. This is more frequently observed in young subjects, seldom in adults, and scarcely ever in persons of advanced years. But trusses must be worn a long while; nor should the patient venture to lay aside their use till after many cautious attempts; beginning the experiment at first only in the night-time, and not making it in the day till after a considerable period from the time, when he first thinks himself safe. The longer and more attentively a truss is worn, the greater is the hope of a radical cure. (*Callisen, Syst. Chir. Hod. T.* 2.)

In the 2d vol. of the last edition of the First Lines of the Practice of Surgery, the truss for navel ruptures, which was devised by Mr. Eagland and latterly preferred by Mr. Hey, is described; and in the article *Hernia*, an account is given of the truss for umbilical hernia, invented by Mr. Marrison of Leeds, and described by Mr. Hey. In the same part of this Dictionary may also be found some observations, relative to the place, against which the pressure of the pads of trusses should be directed in cases of inguinal hernia, in conformity to Sir A. Cooper's description of the situation, at which the parts first protrude from the abdomen.

TUMOUR. A swelling. In the present article, I intend only to treat of what are usually called sarcomatous and encysted tumours. Mr. Abernethy thinks, that the manner in which tumours are formed is best illustrated by those which hang pendulous from the membranous lining of different cavities. This gentleman adverts to an example noticed by Mr. Hunter, in which, on the cavity of the abdomen being opened, there appeared lying upon the peritoneum, a small portion of red blood recently coagulated. This, on examination, was found to be connected with the surface, upon which it had been deposited, by means of an attachment, half an inch long, and this neck had been formed before the coagulum had lost its red colour. (See *Trans. for the Improvement of Med. and Chir. Knowledge, Vol.* 1, *p.* 231.) Mr. Abernethy observes, that if vessels had shot through the slender neck, and organized the clot of blood, this would then have become a living part: it might have grown to an indefinite magnitude, and its nature and progress would probably have depended on the organization, which it had assumed. He mentions his possession of a pen, found growing from the surface of the peritoneum, and which was undoubtedly formed in the same manner as the tumour noticed by Mr. Hunter, viz. by vessels shooting into a piece of extravasated blood, or lymph, and rendering it a living organized substance. Tumours, in every situation, and of every description, are probably formed in the same way. The coagulating lymph being effused, either accidentally, or in consequence of disease, is afterward converted into a living part, by the growth of the adjacent vessels and nerves into it. Mr. Abernethy remarks, that, when the deposited substance has its attachment by a single thread, all its vascular supply must proceed through that part: but, in other cases, the vessels shoot into it irregularly at various parts of its surface. Thus, an unorganized concrete becomes a living tumour, which has at first no perceptible peculiarity as to its nature. Although its supply of blood is furnished by the vessels of the surrounding parts, it seems to live and grow by its own independent powers, while its future structure seems to depend on the operation of its own vessels. Mr. Abernethy conceives, that the altered structure of an enlarged gland affords no contradiction to the above account, as, in this latter case, the substance of the gland is the matrix, in which the matter, forming the tumour, or enlargement, is deposited. The structure of a tumour, he observes, is sometimes like that of the parts, near which it grows. Such as are pendulous in joints, are cartilaginous, or osseous. Fatty tumours frequently form in the midst of the adipose substance; and he has seen some tumours growing from the palate, which had a slender attachment, and resembled the palate in structure.

However, this resemblance of the structure of a tumour to that of the neighbouring parts, is not always observable. I have in my own possession a completely cartilaginous tumour, which I found in the midst of the fat near the kidneys. The pendulous portion of fat, growing from the peritoneum, and mentioned by Mr. Abernethy, serves as another instance of the fact; and, one might add, that every polypus which we meet with, bears no resemblance in structure to the neighbouring parts. Mr. Abernethy mentions his having seen bony tumours, which were unconnected with bone, or the periosteum, and he observes, that the structure of a tumour is, in general, unlike that of the part in which it is produced.

When the coagulable part of the blood is effused, and the absorbents do not take it away, the surrounding blood-vessels are supposed to grow into it, and convert it into a vascular tumour. The effusion of the coagulable part of the blood may be the effect of accident, or of a common inflammatory process, or it may be the consequence of some diseased action of the surrounding vessels, which (diseased action) may influence the organization, and growth of the tumour.

In the former cases, the parts surrounding the tumour may be considered simply as the sources, from which it derives its nutriment, while it grows apparently by its own inherent powers, and its organization depends upon actions begun and existing in itself. If such a tumour be removed, the surrounding parts being sound, soon heal, and a complete cure ensues. But if a tumour be removed, whose existence depends on the disease of the surrounding parts, which are still left, and this disease be not altered by the stimulus of the operation, no benefit is obtained. These parts again produce a diseased substance, which has generally the appearance of fungus, and, in consequence of being irritated by the injury of the operation, the disease is in general increased by the means which were designed for its cure. It appears, therefore, that in some cases of tumours, the newly-formed part alone requires removal, whilst in others, the surrounding substance must be taken away, or a radical cure cannot be effected. (*Abernethy's Surg. Obs.* 1804.) This gentleman conceives, that the irritation of the tumour itself, when once the swelling has been produced, keeps up an increased action in the surrounding vessels, so as to become a sufficient cause of the disease continuing to grow larger. As the tumour becomes of greater magnitude, it condenses the surrounding cellular substance, and thus makes for itself a sort of capsule. The close, or loose manner, in which tumours become connected with the surrounding parts, seems to depend very much on the degree of irritation and inflammation excited in the circumjacent parts. When a tumour has been at all tender, painful, and inflamed, it is generally found intimately adherent to all the neighbouring parts. Mr. Abernethy also believes, that the increased irritation which a tumour creates when it has exceeded a certain size, may explain why some tumours, which are at first slow in their progress, afterward begin to grow with great rapidity.

The process by which tumours are formed, is commonly thought to be attended with an increased action of the vessels, which supply the swellings with blood. It is supposed, in short, to be the same kind of process, which forms all the thickenings and indurations, which, under various circumstances, occur in different parts of the human body. It has sometimes been named *chronic* inflammation, to distinguish it from that which is more quick in the production of certain effects, and is often attended with a manifest throbbing in the part affected. This subject of chronic, or passive inflammation is one, about which very little certain is known; and the very name has commonly been admitted only on the supposition, that some kind of increased action exists in the vessels, though of a slower and less evident kind, than what prevails in acute inflammation. According to Dr. Wilson Philip, the difference between what is called active and passive inflammation seems to depend upon "the degree, in which the arteries supplying the *vis à tergo* to the debilitated vessels are excited."—(*Laws of the Vital Functions*, p. 282, *Edit.* 2.) If this position be satisfactorily established, one important step will be made to a knowledge of the differences between acute and chronic inflammation; but, much would yet remain for explanation before our ideas of the latter process would be at all complete.

In a work of considerable merit, Dr. Baron of Gloucester, offers many considerations against the correctness of the ordinary doctrines, respecting the formation of tubercles and tumours. By *tubercles*, he means disorganizations composed of one cyst, "whatever be its magnitude, or the nature of its contents," and by *tumours*, he would understand "morbid structures, that appear to be composed of more than one tubercle." (*On Tuberculated Accretions of Serous Membranes, &c.* p. 213.) From certain appearances, traced in dissections, Dr. Baron infers, that all tubercles, wherever situated, and of whatever substance composed, were at their commencement small vesicular bodies, with fluid contents; hydatids, as he endeavours to prove. "It is impossible to say, how minute they may have been at their origin, nor how large they may grow, before their transformations begin; nor are we acquainted with the circumstances which occasion such transformations." To these *changes* in hydatids, (according to this writer,) certain tubercles owe their existence, and "on the *size, relative position*, and *structure of the tubercles, which are so formed, depend the characters of many of the most formidable disorganizations*, to which the human body is exposed. (*P.* 215.) A single hydatid, when it is transformed (says Dr. Baron) will give rise to one tubercle. "It may be pendulous, or embedded in any soft part, or it may be found between the layers of membranes, and wherever the textures are of such a nature as to admit of its growth. It may be so small as to be scarcely visible, or, it may acquire a very great magnitude. Single tubercles are often seen in a viscus, while all the rest of the organ is free from disease, and its functions are performed in an uninterrupted manner. But, it is evident, that the same state of the system, (whatever that may be,) which calls one tubercle into existence, may generate an indefinite number. They may be diffused through the whole of a viscus, leaving nothing of its original texture, or they may occupy any proportion of it, or extend to the contiguous parts, and involve them in the same form of disease." (*P.* 216.) When hydatids growing in clusters, and hanging within cavities, become changed into tubercles, Dr. Baron conceives, that the morbid appearances must of course correspond in some degree, with the original distribution of the parts. He has seen tubercles attached in this form to the choroid plexus, to the valves of the heart, to the fimbriated extremities of the Fallopian tubes, and to the omentum, and convolutions of the bowels. In the latter instance, they were very minute, the largest not being bigger than the head of a pin, and their number defied all calculation.

"Other varieties in the arrangement of the elementary parts of morbid growths, will of course cause corresponding varieties in their appearance. Thus, *when hydatids are enclosed, the one within the other, and are transmitted into solid substances, a section of these substances will exhibit a series of concentric laminæ.*"

Another variety pointed out by Dr. Baron, is "when an immense number of very small tubercles are generated in juxtaposition, and unite together. Wherever such an event occurs, the original texture of the part is entirely lost, and a mass of varying degrees of density and firmness formed. In the earlier stages of its growth, a granulated appearance may be distinctly traced; but, in process of time, this disappears, the consolidation becomes more complete, and substances of a gristly, or cartilaginous, or scirrhous texture may be found. I have traced (says Dr. Baron,) the whole of these gradations in the liver, the lungs, the pleura, the omentum, the peritoneum, and in tumours in other parts." (*P.* 219.)

"Sometimes, small hydatids grow from the outer or inner surface of large ones, or float within them. I have seen, (says Dr. Baron,) from a source of this kind, the uterus and its appendages converted into an enormous misshapen mass, tubercles of the size of the fist growing from it, while these again were surmounted by smaller ones in many gradations. Some had glairy contents, others were in a state of scirrhosity, and others were but little changed, having thin delicate cysts, and containing a transparent fluid.

"But, perhaps, (remarks Dr. Baron) the most important variety of all, is when tubercles, originally distinct from each other, approximate as they increase in size, ultimately unite, and form tumours, which have received different designations, according to the predominant character of their contents and internal structure. It was chiefly to elucidate this part of the subject, that I made the distinction between the words tumour and tubercle, &c." (*P.* 219.) By thus adverting to the primitive arrangement, number, size, &c. of hydatids, and their subsequent mutations, Dr. Baron tries to account for the varieties of encysted and sarcomatous tumours, fungus hœmatodes, tuberculated sarcoma, scirrhous swellings, &c. &c. The late Dr. Adams, as is well known, referred cancer to the living state, growth, and multiplication of the hydatid. (*On the Cancerous Breast, p.* 77.) In order to account for the various appearances of the disease, he has divided hydatids into a number of species, as *lymphatica*, *cruenta*, and *carcinomatosa*, and suspects that there may be others. These, he affirms, are lodged in different cavities, or enclosed in a fungus, which is occasioned by any individual, or numbers, stimulating the surrounding parts to generate it, for the purpose of dividing the dead from the living. This fungus is a nidus, formed altogether for the protection of another generation; by means of it, the living families are separated from the dead, and their preservation is secured. They die, he says, without otherwise affecting the body in which they existed, but by their local stimulus, and he declares, that his object is to prove the *animalcular existence* of carcinoma. Now, according to Dr. Baron, this main position is the fundamental error of Dr. Adams's book; for, "in no rational, nor legitimate point of view may cancer be said to have an *animalcular existence;* because admitting, for the sake of argument, that hydatids are animalcules, it has, I trust, been shown, (says Baron,) that *it is to the loss of the hydatical character altogether, and the transformations of these bodies, that the morbid appearances in this, and many other diseases, are to be referred.*" (*P.* 276.)

Although I consider the evidence and remarks, which Dr. Baron has adduced, in support of his opinions in many respects interesting, the facts brought forward do not appear to me to justify the conclusion, that the formation of tubercles and tumours originally depends upon hydatids, and their transformation. That hydatids are sometimes found within diseased structures, and that cells, cysts, granulated, and tuberculated appearances are often noticed in tumours of different kinds, are facts universally received. But the presence of hydatids in the *unchanged* state is only an occasional circumstance, whereas, if they were generally a cause of tumours by undergoing some unexplained transformation, it is impossible to suppose, that some of them, at least, would not be more commonly found in a distinct, unaltered form within, or around all swellings, imagined to proceed from clusters of them. As the growth of tumours, formed on these principles, could not, I imagine, be accounted for, without supposing a continual multiplication and transformation of hydatids, either within, or around the swellings, one would expect, that some visible hydatids, previously to their transfiguration, would certainly be apparent on minutely examining the interior and the circumference of the diseased structure. Yet, I am not aware, that such fact has been proved to be generally the case, either by the aid of the scalpel, or the microscope. The observation of cavities, cells, and tuberculated appearances in some kinds of tumours, is no proof that such modifications of structure are transformed hydatids. Besides, if my limits would allow me to consider this topic further, many reasons might be urged against the hydatid doctrine, arising from the consideration of the changes evident in the blood-vessels, supplying parts, in which a considerable tumour is situated. Thus, we often see the trunks of the arteries, running towards such parts, doubled in size, just as is noticed, with respect to the carotid in the natural growth of the stag's horn, and indicating, at least, that the formation and increase of swellings are effected through the medium of the blood-vessels. The sudden effect of tying the arteries, by which a tumour is supplied with blood, would also be difficult to explain, if the growth of the swelling really depended upon some undefined transformation of hydatids.

It seems to be generally admitted, that the growth of all tumours may be retarded, and that sometimes they may even be diminished by means of topical bleeding with leeches, and keeping the parts in a continually cool state, by the incessant application of cold sedative washes. Afterward, when the increased action of the vessels seems checked, and the tumour ceases to enlarge, discutients are indicated, such as frictions with mercurial ointment, pressure, electricity, rubefacient plasters, solutions of salts, blisters, and issues. Very few sarcomatous or encysted tumours, however, are ever completely removed by these local means. The swelling, on the contrary, generally increases, notwithstanding them, and the irritation of the disease by stimulants is not altogether unattended with danger of the affection becoming changed by them into very malignant and dangerous cases, sometimes to all appearances cancerous. The most adviseable plan is to recommend the removal of sarcomatous tumours with the knife, while they are small, and in an incipient state. For thus they are got rid of by an operation, which is certainly trivial, compared with what might afterward become requisite, if the disease were allowed to proceed, and attain an enormous magnitude.

Tumours, Sarcomatous. These have been so named, from their firm, fleshy feel. They are of many kinds, some of which are simple, while others are complicated with a malignant tendency. Mr. Abernethy has attempted to form a classification of sarcomatous tumours, for the different species of which he has proposed names, deduced from the structure, which they exhibit on dissection. This gentleman has named the kind of swellings, which he first considers, *Common Vascular*, or *Organized Sarcoma*. Under this title, Mr. Abernethy includes all those tumours, which appear to be composed of the gelatinous part of the blood, rendered more or less vascular by the growth of vessels through it. The vessels which pervade this substance are, in different instances, either larger or smaller; and more or less numerous; being distributed in their usual arborescent manner, without any describable peculiarity of arrangement. Perhaps all the varieties of sarcomatous tumours are at first of this nature. The structure under consideration, is met with not only in distinct tumours, but also in the testis, mamma, and absorbent glands. When a common vascular, or organized sarcoma has attained a certain magnitude, the veins of the skin seem remarkably large, and their winding under the integuments excites notice. This kind of sarcoma is not at all tender, so that it may be freely handled, and also electrified, without giving pain. The tumour sometimes grows to such a size that the skin bursts, the substance of the swelling sloughs out, and the disease is got rid of. However, this mode of cure is attended with such terrible local appearances, and so much fever, &c. that the removal of the disease with the knife is to be preferred.

The second kind of sarcomatous tumour, noticed in Mr. Abernethy's classification, is the *Adipose Sarcoma*. Every one, at all in the habit of seeing surgical diseases, must know, that fatty tumours are exceedingly common. Mr. Abernethy believes, that these swellings are formed in the same manner as others, viz. in the first instance they were coagulable lymph, rendered vascular by the growth of vessels into it, and that their future structure depended on the particular power and action of the vessels. According to Sir Astley Cooper, "they are not composed of fatty matter only; but the adipose membrane is increased, and their structure is similar, only somewhat more compact, to that of the fatty membrane in other parts of the body." (*Med. Chir. Trans. Vol.* 11, *p.* 440.) This fact is very much against the doctrine, which ascribes the origin of tumours to hydatids and their transformation. Adipose sarcomatous tumours always have a thin capsule, formed by the simple condensation of the surrounding cellular substance. It adheres very slightly to the swellings, and, chiefly by means of vessels, which pass through this membranous covering in order to enter the tumour. As Mr. Abernethy has accurately described, the vessels are so small, and the connexion so slight, that, in removing the tumour, no dissection is requisite, as the operator may easily put his fingers between the swelling and its capsule, so as to break the little vascular connexions, and entirely detach the disease.

The substance of adipose tumours is never furnished with very large blood-vessels, and the fear of hemorrhage, which frequently deters surgeons from operating, is quite unfounded. It is an undoubted fact, that there is no species of tumour, that can be removed with so much celerity, with such apparent dexterity, or with such complete security against future consequences, as those of an adipose nature. However, now and then, when the tumour has been at all in an inflammatory state, the capsule becomes thickened, and intimately adherent to the surface of the swelling, so that the separation of the disease is more difficult, and requires the knife to be more freely employed. The tumour also sometimes becomes, after inflammation, closely adherent to the contiguous parts. Adipose tumours often acquire an enormous magnitude. Indeed, there can be no doubt of the fact stated by Sir Astley Cooper, that they acquire a greater magnitude than any other swelling ever reaches. Mr. Abernethy relates an example of one, removed by Mr. Cline, which weighed between 14 and 15lbs., and which I saw myself previously to the operation. Sir Astley Cooper also mentions the successful extirpation of several adipose tumours of immense size: one weighing 14lb. 10℥. removed by himself; another weighing 15lbs. removed by Mr. Cline; and a third, weighing 22lbs. removed from a lady's thigh by Mr. Copeland. But the most remarkable case is one, in which Sir Astley Cooper lately removed a fatty swelling which weighed, independently of the blood in it, 37lbs. 10ozs., and was situated on the abdomen of a man, aged 57. (See *Med. Chir. Trans. Vol.* 11, *p.* 440.) Although it is true, that when adipose swellings attain an enormous bulk, the immense size of a wound requisite for their removal, must be dangerous, and is a strong argument in favour of having recourse to the operation at an earlier period, yet it is equally true, that large fatty swellings may be taken out, with a greater prospect of success, than any other kind of tumour of equal size.

The next species of sarcoma, noticed in Mr. Abernethy's classification, is what this gentleman names *pancreatic*, from the resemblance of its structure to that of the pancreas. This kind of disease, according to Mr. Abernethy, is occasionally formed in the cellular substance; but, more frequently, in the female breast, on that side of the nipple which is next to the arm. When a pancreatic sarcoma is indolent, and increases slowly, the surrounding parts, and the glands in the axilla, are not affected. But some of these swellings deviate from their common character, and become of a very irritable nature, occasioning severe and lancinating pain, and producing an inflammatory state of the skin covering them, so that it becomes adherent to their surface. The absorbents leading to the axilla are also irritated, and the glands enlarged. Pancreatic sarcoma does not grow to a very large size; but, when its progress is unrestrained, the pain attendant on the disease becomes lancinating, and so severe as to make the patients feverish, and lose their health and strength. Mr. Abernethy remarks, that, when the axillary glands become affected, one generally swells at first, and is extremely tender and painful; but afterward the pain abates, and the part remains indurated. Another is then affected, and runs through the same course.

To another species of sarcoma, Mr. Abernethy applies the epithet *mastoid*, or *mammary*, from the resemblance which this gentleman conceives its structure bears to that of the mammary gland. This kind of disease, Mr. Abernethy says he has not often seen. In the example which he met with, the tumour was about as large as an orange, and situated on a woman's thigh. The swelling was removed by an operation; but the wound afterward degenerated into a malignant ulcer, attended with considerable induration of the surrounding parts, and the woman died of the disease in two months. Mr. Abernethy conceives, that the whole of the morbid part had been cut away, but that the contiguous parts had a disposition to disease, which was irritated by the operation, and that if the nature of the case could have been known beforehand, it would have been right to have made a freer removal of the substance surrounding the tumour.

Mr. Abernethy places the mastoid sarcoma, between such sarcomatous swellings as are attended with no malignity, and the following ones, which have this quality in a very destructive degree.

The *tuberculated* sarcoma is composed of a great many small, firm, roundish tumours of different sizes and colours, connected together by cellular substance. Some of the tubercles are as large as a pea; others equal a horsebean in size; most of them are of a brownish red colour; but some are yellowish. Mr. Abernethy mentions his having seen this species of sarcoma chiefly in the lymphatic glands of the neck. The disease proceeds to ulceration; becomes a painful and incurable sore, and ultimately occasions death.

Another kind of sarcoma, mentioned in Mr. Abernethy's classification of tumours, is distinguished by the epithet *medullary*, from its having the appearance of the medullary matter of the brain. It appears to be an exceedingly malignant disease; communicates to the lymphatic glands a similar distemper; ulcerates and sloughs, and at last proves fatal. It is particularly apt to make its attack on the testis, and it is treated of in another part of this book. (See *Testicle, Diseases of.*)

Mr. Abernethy includes also in his classification, *carcinomatous* sarcoma. (See *Cancer.*)

I must refer to another article, (*Mamma, Removal of,*) for an account of the plan of removing sarcomatous tumours.

Besides many operations, which have of late years been performed, and are remarkable, on account of the great size of the swellings removed, others, still more interesting, claim attention, on account of the nature and situation of the parts extirpated, On the excision of the thyroid gland, I need not here dwell, as it is elsewhere noticed. (See *Thyroid Gland;*) but I feel called upon to mention some other very bold operations, executed within the last few years. The first is that performed by Mr. Goodlad, of Bury, in Lancashire. The case was an immense tumour, situated on the left side of the face and neck, and the base of which was about twenty-eight inches in circumference. The disease extended from the external canthus of the eye above to within three-quarters of an inch of the clavicle below, and some idea of the depth of its attachments may be conceived, when it is known, that the whole parotid gland was involved in it. For the purpose of obviating all danger of hemorrhage, Mr. Goodlad began with tying the carotid artery. The nature of the operation will be best understood by adverting to the appearances afterward presented by the wound. "The whole sterno-mastoid muscle was exposed, and its fibres dissected clean, except about half an inch from its insertion into the clavicle. The wound extended backwards from behind the mastoid process to the trachea anteriorly, but became narrower in the direction of the muscle at the lower part of the neck. The submaxillary gland was exposed, and about one-fifth of its substance, not appearing healthy, was removed. The digastric and the greater portion of the mylo-hyoideus were exposed. The ramus of the jaw was only covered by periosteum, except where covered by the masseter muscle, part of which, not appearing healthy, was dissected away. The whole of the condyloid process of that bone was laid bare in the same manner, and behind it the pterygoid muscles were also exposed. The membrane of the cheek was only covered by a cellular substance, which did not appear healthy; but sufficient skin was saved to cover the zygoma. *The parotid gland was entirely removed.*" This enormous wound healed in ten weeks; but unfortunately the cure was not permanent; the disease returned, and, fifteen months after the operation, the poor woman died. (See *Med. Chir. Trans. Vol.* 7, *p.* 112, *&c. Vol.* 8, *p.* 582.)

Respecting the foregoing severe operation, many surgeons may be inclined to doubt the propriety of tying the carotid artery, as a preparatory step, and, indeed, it is positively condemned in an anonymous note attached to the above case, simple temporary pressure on the exposed vessel being represented as preferable. It appears to me, however, that Mr. Goodlad's method was justifiable, and on the whole the best, because the application of the ligature to the carotid not only removed the dangers of hemorrhage during the operation, but obviated them afterward, and no doubt lessened the necessity for a prodigious number of ligatures, for vessels, which would otherwise have poured out a profuse quantity of blood.

Nay, the hemorrhage is so profuse from the main branches of the external carotid, and mere pressure so uncertain of always commanding the flow of blood, that the patient may actually die from sudden loss of blood, as nearly happened in another very interesting case of removal of a large tumour involving also the parotid gland, and connected with the transverse process of the atlas, the basis of the skull, the meatus auditorius, mastoid process, and angle of the jaw. The operator, Mr. Carmichael, in order to complete the dissection, was obliged to divide the trunk of the facial artery: "instantly (says he) an alarming gush of blood, which evidently came from a large vessel, followed the division; *and the danger appeared the more imminent as the pressure, which Mr. Todd applied, with all the force he could exert upon the carotid trunk, was actually incapable of repressing the torrent.* There was not a moment to be lost. Mr. Colles plunged a dry sponge to the bottom of the wound, and firmly pressed on the bleeding vessel, while I made a horizontal section of the tumour, till I arrived at the cavities occupied by the sponge, with the view of exposing as quickly as possible the mouth of the bleeding vessel. This was accomplished in sufficient time to save the patient's life.' Mr. Carmichael, at the conclusion of the history, remarks, that, if he were called upon to perform such an operation again, *he would, in the first instance, pass a ligature under the carotid trunk, which might be* tightened, or not, as occasion should require. The case here spoken of had a successful termination. One remarkable consequence was a paralysis of one side of the face, brought on by the division of the trunk of the portio dura in the operation. (See *Trans. of the King's and Queen's College of Physicians, Vol.* 2, *p.* 101, 8*vo. Dublin,* 1818.)

The next instance which I shall notice, of the removal of an enormously enlarged parotid gland, is that lately recorded by Klein, the eminent operating surgeon at Stuttgardt. The patient was a woman of seventy, and the swelling extended from the ear to the shoulder. In the operation, all the branches of the facial nerve were divided; a piece of the masseter was left hanging; the external carotid artery and par vagum were left quite bare; the dissected sterno-mastoid lay on on side; and the temporal, external maxillary, and auricular arteries were of course divided, along with several arteries of the neck, yet the largest of these being tied, the bleeding was very inconsiderable. The event was so successful, that at the beginning of the third week, the wound was entirely healed.

The same distinguished surgeon also removed a fatty tumour, *extending from the buttock to the ham, and measuring three feet one inch in length, and two feet six inches in circumference.* Klein undertook its removal, on the supposition, that it was an encysted tumour lying above the fascia lata; but it turned out to be a steatoma coming from beneath it, and reaching to the thigh-bone, and in every direction among the muscles, nerves, and blood-vessels of the thigh. At length, partly with the fingers, and partly with the knife, the fatty mass was separated from all its important connexions. Several vessels were tied, and among them the profunda femoris. However, not more than a pound of blood was lost. The tumour, after its removal, *weighed 27lb. and three quarters.* The patient, a woman 44 years of age, went on very well for eight days; but on the ninth, she was constantly complaining of uneasiness in the foot of the affected limb; her pulse became weak and intermitting; and she sunk in the most unexpected manner. (See *Journ. für Chirurgie herausgegeben von D. L. Graefe und D. P. F. Walther, B.* 1, *p.* 106, *&c.* 8*vo. Berlin,* 1820; *or Quarterly Journal of Foreign Medicine, &c. Vol.* 2, *p.* 373, *&c.*)

A question may be entertained, whether, in some morbid enlargements of the parotid gland, and parts extending deeply about the throat, it would not sometimes be better to be content with simply tying the carotid artery, and trying whether stopping this large supply of blood to the diseased parts, would not be followed by an absorption of the tumour? Some facts, appertaining to this question, are noticed in the article *Aneurism*, where the aneurism by anastomosis falls under consideration. It will there be seen, that the result of this experiment is not sure of permanently repressing the growth of a tumour of this last kind, even when it has this effect at first. This uncertainty will, no doubt, incline many practitioners to prefer the bold method of extirpation. Yet others will perceive, that such an operation, notwithstanding its success in a few examples, is dreadfully severe, and must of itself in the generality of cases have fatal consequences. They will also be encouraged, in any similar instance, to try the effect of the ligature, by the cure which Sir A. Cooper accomplished, of an enormous cutaneous enlargement of the lower extremity by tying the artery in the groin. Indeed, I am sure, that as the improvements in modern surgery advance, the plan of curing tumours by cutting off their main supply of blood, will be much more extensively adopted, than has hitherto been the case. In this way, the surgeon may attempt the dispersion of many tumours, which could not be meddled with in any other manner, and which, if left to themselves, must have a fatal termination.

TUMOURS ENCYSTED. These, which are commonly named wens, consist of a cyst, which is filled with different substances. When the contained matter is fatty, it is termed a *steatoma;* when somewhat like honey, *meliceris;* when like pap, *atheroma.* These are the three species, into which writers usually divide encysted tumours. However, some of these swellings do not conform to either of the above distinctions, as their contents are subject to very great variety indeed, and are occasionally of an earthy, bony, or horny nature. Some encysted tumours of the latter description occasionally burst, and assume the appearance of horns, by the gradual projection of the matter secreted within their cysts. (See *Sir Everard Home's Obs. on the Growth of Horny Excrescences, in Phil. Trans. for* 1791.) I remember seeing an excrescence of this kind removed some years ago from the scrotum of a man in St. Bartholomew's Hospital. Sir James Earle performed the operation, and if I am not mistaken, the preparation of the disease is now in Mr. Abernethy's museum. But still more remarkable specimens of such excrescences are preserved in the Anatomical Museum of St. Thomas's Hospital; one in particular, which resembles a ram's horn in shape, and was removed from a gardener's head at Kingston, by Dr. Roots. A further account of the case is given in Rees's Cyclopædia, article *Horny Excrescence.*

I suppose every body in London has now seen in the British Museum the horn deposited there as a curiosity, and which, with another of the same size, grew upon the head of a human subject. What is equally curious, hairs are not unfrequently found growing in the cavities of encysted tumours, (*Delpech Précis des Mal. Chir. T.* 3, *p.* 412;) and even teeth, more or less perfectly formed, have been strangely met with in the same situations. An interesting specimen of the latter occurrence, in a double encysted tumour in the orbit, was published some time ago by my friend Mr. Barnes, of Exeter. (See *Med. Chir. Trans. Vol.* 4, *p.* 316.)

It is observed by Sir Astley Cooper, that it is when encysted tumours are situated upon the temple, and near the eyebrows, and other hairy parts, that they sometimes contain hairs: these "have no bulbs, nor canal, and differ therefore from those, which are produced in surfaces of the body, which naturally form hair." In sheep, the cysts sometimes contain wool. (*Surgical Essays, Part* 2, *p.* 233.) The manner in which these horny excrescences are produced, is stated to be as follows: "The horn begins to grow from the open surface of the cyst; at first, it is soft, but soon acquires considerable hardness; at first it is pliant, but after a few weeks, it assumes the character of horn." (*Vol. cit. p.* 235; see *also Home in Phil. Trans. for* 1791.)

Encysted tumours are generally of a roundish shape, and are more elastic than fleshy swellings. However, the latter circumstance depends very much upon the nature of their contents, and the thickness of their cysts. As far as my observation extends, encysted tumours form more frequently on the head than any other part; but they are very frequently met with in all situations under the integuments, and sometimes in deeper places. Encysted tumours are also very often seen on the eyelids.

According to Sir Astley Cooper, they are in general nearly globular, and when seated on the head, feel very firm, but upon the face they are attended with a fluctuation, more or less obscure. The skin covering them, is generally uninflamed; but it is now and then streaked with blood-vessels, which are larger than those of the surrounding integuments. "In the centre of the tumour on the skin, it often happens that in its early state, a black, or dark-coloured spot may be seen, which sometimes continues through the whole course of the disease. In general they are unattended with pain, are never in themselves dangerous, and only require removal from the parts in which they occur, and the unseemly appearance they produce. They move readily within the cellular membrane, if they are free from inflammation, but the skin in general does not easily move over them." (*Surgical Essays, Part* 2, *p.* 230.) The greatest number of encysted tumours, which this experienced surgeon has met with in the same individual, was sixteen, situated upon the head; and he has seen nine in another patient, as many as which number on one person I have seen myself. Four, five, and six, as Sir Astley remarks, are not uncommon. The largest, which he has ever seen, was equal in size to an ordinary cocoa nut, and grew upon the head; but in general, they are not more than one or two inches in diameter. He considers them in some degree hereditary, as he has often heard a patient observe; "I have several swellings upon my head, and my father (or my mother) had several." They also frequently occur in several of the same family. (*P.* 231.)

According to Sir Astley Cooper, when encysted tumours are dissected, some part of their surface is found firmly adhering to the skin, while other parts are connected to it merely by the cellular membrane. The cyst itself is imbedded more or less deeply in the cellular membrane, and its thickness is different in different parts of the body. On the face, or near the outer canthus, the cyst is very thin; but on the back, it is much thicker, and on the head, it is so thick and firm, that it retains its form after the discharge of its contents, and is so elastic, that after being compressed, it readily expands again to its former size. Within the cyst, Sir Astley Cooper remarks, there is a lining of cuticle, which adheres to its interior, and several desquamations of the same substance are formed within the first lining. If the vessels of the cyst are injected, they are found to be numerous, but of small size. The cysts are occasionally met with in an ossified state. (*Surgical Essays, Part* 2, *p.* 232, 233.) It is the opinion of Sir Astley Cooper, that encysted tumours arise from the enlargement of the follicles, or glandular pores, in consequence of the obstruction of their orifice. (*P.* 236.) If this sentiment were correct, the fact would furnish another consideration against the view taken of the formation of the tumours by Dr. Baron. However, it appears to me, that there are some reasons, which render the adoption of Sir Astley's explanation difficult; for, if encysted tumours were only enlarged follicles, they would not be found so far from the skin as they frequently are, as for instance within the orbit, and in other situations yet further from the surface of the body; and the collections of sebaceous matter, which so often collects, as this gentleman observes, in the follicles of the skin of the nose, and may be pressed from them in the form of worms, would, if the cause assigned were true, make encysted swellings on the nose itself exceedingly common; yet this part is not so often the seat of such tumours, as other parts of the face. As far also as my observations extend, pressure cannot be said to have any share in giving rise to the formation of encysted tumours, because I have seen them chiefly in situations, where this kind of cause could not be suspected, as for instance, on the face and about the vertex, and not particularly round that part of the head, which is compressed by the hat. If also encysted swellings were owing to obstruction of the cutaneous pores with sebaceous matter, I apprehend few persons would escape the disease. The cure in the early stage would also be as easily effected by the timely removal of the alleged obstruction, as the cure of the little tender points on the nose, really caused by the lodgment of the sebaceous matter in the cutaneous pores. This does not appear to me to be consonant to general experience. How the formation of steatomatous encysted swellings is to be thus accounted for, I cannot at all conceive. And, lastly, it is to be noticed, that the little swellings on the nose, arising in the way described, are, when they occur, frequently attended with soreness, from which true encysted tumours, at least in the early stage, are completely free. These, and other reflections, lead me to believe, that the origin of encysted swellings cannot be satisfactorily explained upon the principles suggested by the above distinguished practitioner. However, as all his opinions on surgical questions are deservedly valuable, I subjoin the advice which he has given, founded upon the preceding doctrine. If the follicle can be seen only as a black spot, filled with hardened sebaceous matter, Sir Astley Cooper recommends introducing a probe into it, and squeezing the sebaceous matter out of the tumour, which is done with little inconvenience. But, if the contents cannot be pressed out without such violence as would create inflammation, he says, that the best plan is to make the opening larger. Other surgeons have tried to cure encysted tumours by pricking them with needles, and squeezing out their contents; or by applying stimulating and discutient applications to them. However, it is a practice which mostly fails, and, sometimes, converts the case into a terrible disease, in which a frightful fungus shoots out from the inside of the cyst, attended with immense pain and irritation, and often proving fatal. (See *Abernethy's Surgical Observations,* 1804, *p.* 94.)

Similar dangerous fungous diseases may also arise, whenever the surgeon, in cutting out encysted tumours, leaves any part of the cyst behind.

The most adviseable method, I believe, is to have recourse to the knife, before an encysted tumour has attained any considerable size. However, if it is large at the time of the operation being done, a portion of the skin must be taken away with the swelling, in the manner described in the article *Mamma, Removal of.* The chief piece of dexterity in the operation consists in detaching all the outside of the cyst from its surrounding connexions, without wounding it. Thus, the operator takes the part out in an entire state, and is sure, that none of the cyst remains behind. When the cyst is opened, some of the contents escape, it collapses, and the dissection is rendered more tedious and difficult.

Such is the common opinion, which has always appeared to me correct. However, Sir Astley Cooper states, that the best manner of doing the operation is to make an incision into the swelling, and then to press the sides of the skin together, by which means the cyst may be easily everted and removed. If the attempt be made to extract the tumour whole, "the dissection is most tedious, and before it is completed, the cyst is either cut, or burst. So many incisions, and so much pain, may be readily prevented by opening it freely by one incision, raising its edge between the forceps," and dissecting it from its adhesions to the surrounding membrane. (*Surgical Essays, Part* 2, *p.* 240.) When the swelling is in the scalp, Sir Astley directs an incision to be made through its centre, from one side to the other, when its contents, which in this situation are very solid, are immediately discharged in a mass of the same shape as the tumour. The cyst being raised with a tenaculum, may then be easily separated.

With respect to encysted tumours of the eyelids, the atheroma and meliceris are said by Beer to form only upon the upper eyelid, on the side towards the temple, while he has always found the steatoma to be seated either in the vicinity of one of the eyelids, or sometimes over the lachrymal sac. The atheroma and meliceris, he says, usually lie in the loose cellular substance directly under the skin of the eyelid, though sometimes more deeply under the orbicularis muscle, or even quite underneath the levator palpebræ superioris, upon the convex surface of the tarsal cartilage, to which the swelling is then generally so firmly adherent, that it is impossible to remove this part of the cyst. Encysted tumours of the upper eyelid are commonly so moveable, that they can be pushed above the superciliary ridge of the os frontis; which is regarded by Beer as a very favourable circumstance in the operation. Though the atheroma and meliceris of the upper eyelid occasionally become as large as a pigeon's egg, Beer has never known a steatoma in the vicinity of the eyelids exceed the size of a hazel nut. Encysted tumours of the upper eyelid itself sometimes appear moveable, though they may be at the same time closely adherent to the cartilage. Hence, Beer recommends moving the tumour about for a few days before the operation, and trying to push it above the superciliary ridge; and if this cannot be done, the circumstance will prove that the swelling is connected with the cartilage, or, at least, is under the orbicular muscle, and the mode of operating regulated accordingly. With the yellow pappy substance, found in the cysts of arethomatous tumours of the eyelids, fine short hairs, scarcely one line in length, are frequently blended. Sometimes, as Beer remarks, the whole inside of the cyst is covered with these little short hairs, which may all be washed out, and are destitute of bulbs; a fact also noticed by Sir Astley Cooper. It merits attention, however, that in tumours of the meliceris kind, formed upon the eyelid, Beer never met with hairs. (*Lehre von den Augenkr. B.* 2, *p.* 607—609.) He remarks, that when encysted swellings of the eyelid are let alone, he has never known them produce any injury to the eye itself, excepting the hinderance to the opening of it, when they are large. On the other hand, if they be unskilfully removed, or rashly attacked with caustic, various ill consequences may ensue; as for instance, fistulæ of the lachrymal gland, entropium from a shrinking of the tarsal cartilage, ectropium from destruction of the skin, and the hare-eye from an actual shortening of the upper eyelid. In consequence of the inflammation caused by escharotics, Beer has more than once found the integuments so adherent to the tumour, that in the operation, the removal of a considerable piece of them was unavoidable. But, says he, when swellings of this nature are properly treated in good time, they may be removed without leaving any vestige behind, excepting a trivial scar. Professor Beer joins all the best modern surgeons in considering the entire removal of the sac, and the reunion of the wound by the first intention, as the safest and most effectual method of curing encysted tumours of the eyelids. He admits, however, that the hinder portion of the cysts of some swellings of this nature upon the upper eyelid cannot be dissected out, because it may be so closely adherent to the cartilage, that its excision would injure the latter part too much, and produce either an incurable eutropium, or an irremediable shortening of the eyelid. But steatomatous tumours, near the eyelids, may almost always be completely dissected out, the only exceptions being cases in which the swellings happen to be situated between the lachrymal sac and the orbicular muscle, and so intimately connected with the first of these parts, that the back portion of the cyst could not be cut away, without permanently destroying the functions of the excreting parts of the lachrymal organs. However, when the swelling is not too strongly attached to the cartilage of the eyelid, Beer sanctions the removal of the whole of the cyst. He particularly insists upon the utility of moving the tumour a good deal about daily, for a few days before the operation, so as to loosen its connexions, and enable the surgeon to push it over the edge of the orbit, where it may be steadily fixed during its removal. (*B.* 2, *p.* 612.) Excepting a few instances, in which the skin was diseased, and firmly adherent to the cyst, Beer has never found it necessary, in the excision of encysted swellings of the eyelids, to remove any portion of the integuments, and he has cut away some tumours of this kind which were as large as a pigeon's, or hen's egg. The incision through the skin, he says, should be longer than the tumour, so as to facilitate the extraction of the distended cyst. (*B.* 2, *p.* 613.) When it is not adviseable, for reasons above stated, to attempt to dissect out every particle of the cyst, Beer fills the cavity with lint, lets the wound suppurate, and if this plan is not sufficient, he applies stimulants and caustic. It is noticed by Sir Astley Cooper, that encysted tumours, at the outer canthus, are often difficult of removal, on account of their extending into the orbit, and being adherent to the periosteum. (*Surgical Essays, Part* 2, *p.* 241.) Professor Scarpa has strongly recommended making the incision for the extraction of encysted swellings of the palpebræ, on the inside of these parts. But, as Mr. Travers correctly remarks, the swellings are often situated superficially, and loosely connected with the tarsus, in which case the operation should be done on the outside of the eyelid. The latter writer admits, however, that the cyst is often formed betwixt the cartilage and the ligamentary membrane which covers it, and, in his opinion, it is only when an intricate adhesion subsists, and the appearance of a white circumscribed indentation is seen upon the everted tarsus, that the excision should be performed on the inside of the eyelid, by dividing the cartilage. (*Synopsis of the Diseases of the Eye, p.* 357.)

I shall conclude the subject of tumours with a few observations, delivered by Sir Astley Cooper, and Professor Langenbeck. "The removal of encysted tumours, (the first gentleman observes,) is not entirely unattended with danger. I have seen three instances of severe erysipelatous inflammation succeed the operation of removing these swellings upon the head, and I believe it is owing to the tendon of the occipito-frontalis being wounded in the attempt to dissect them out whole." (*Surgical Essays, Part* 2, *p.* 241.)

In the extirpation of tumours about the neck, Langenbeck adopts the following rules: he makes a free division of the integuments, and dissects the muscles from the tumour which lie over it, but he avoids cutting through, or injuring them: in this manner the swelling is rendered more moveable. By the situation of the muscles, he is then enabled to know the place of the chief blood-vessels; and on this account, he particularly advises young surgeons to study myology with the greatest care. As Langenbeck remarks, it is indeed an important advantage, after a muscle is exposed, to know what vessels lie at its edges, or underneath it. Thus, the surtorius is a sure guide to the crural artery, and the sterno-cleido-mastoideus to the carotid. A surgeon who knows correctly the anatomy of the parts, will not be in danger of wounding unintentionally any large vessel. When the surface of the tumour has been cleared, but the base of it is yet firmly attached, Langenbeck commences the separation on the side which presents the least risk, that is, where the least considerable blood-vessels are, and thence he proceeds by degrees towards the most hazardous side. In favour of this method, he offers the following considerations: if, by chance, an artery requiring a ligature should be cut, it can now be more easily secured, as the base of the tumour is already partly detached. The loosened swelling may also be drawn away from the large vessels with the hand, or a tenaculum. Langenbeck never introduces the knife deeply, when there are large blood-vessels there, but pulls the swelling outward, and then divides the cellular substance thus stretched, which is situated upon the already exposed portion of the tumour. In this manner the swelling can always be drawn more and more away from the vessels, until, at last, there is no danger of wounding them. By attending to these principles, Langenbeck has succeeded in removing many very large tumours from the neck, where nearly all the muscles of that part were exposed in the dissection, and the carotid denuded. After one of these operations, not only the stytoid process could be felt, but all the muscles, originating from it, could be distinctly seen. (*Bibl. für die Chir. B.* 2, *p.* 312, *&c.* 12*mo. Gottingen*, 1808.) *C. G. Stentzel, De Steatomatibus in principio Aortæ repertis et Cysticis in genere excrescentibus. Wittersb.* 1723. *J. J. Plenck, Novum Systema Tumorum, quo hi morbi in sua genera et species rediguntur. Pars prior.* 12*mo. Viennæ*, 1767. *Wm. Ogle, Letter concerning the Cure of Encysted and other kinds of Tumours without the Knife.* 8*vo. Lond.* 1754. *Ph. Tr. Walther, über die angebohrnen Fetthautgeschwulsten und andere Bildungsfehler. fol. Landshut.* 1814. *J. P. Weidmann, Annotatio de Steatomatibus.* 4*to. Maguntiaci*, 1817. *W. Hey, Practical Observations in Surgery, p.* 517, *Ed.* 2, 8*vo. Lond.* 1810. *Allan Burns, Surgical Anatomy of the Head and Neck,* 8*vo. Edin.* 1811: *this work contains much valuable information, respecting the extirpation of swellings about the neck. Schreger Chirurgische Versuche, B.* 1, *p.* 297; *Ueber Lipoma und Extirpatio derselben.* 8*vo. Nürnberg.* 1811. *John Baron, An Inquiry, illustrating the nature of Tuberculated Accretions of Serous Membranes, and the Origin of Tubercles and Tumours in different textures of the Body* 8*vo. Lond.* 1819. *Sir Astley Cooper, Surgical Essays, Part* 2. *C. J. M. Langenbeck, Bibl. für die Chir. B.* 2, *p.* 812. *Gött.* 1808. *Also, Geschichte einer grossen Speckgeschwulst welcher mit dem Unterkiefer* *so fest zusammenhing, dass die Trennung mit der Säge verrichtet werden muste : Neue Bibl. B.* 1, *p.* 295. 12*mo. Hanover.* 1817. *B. H. Jacobsen, de Tumoribus Cysticis,* 4*to. Jenæ,* 1792. *C. G. Ludwig Monita de exscindendis Tumoribus tunica inclusis.* 4*to. Lips.* 1758.

TYMPANUM. For an account of its diseases, see *Ear.*

U.

ULCERATION, is the process by which sores or ulcers are produced in animal bodies. In this operation, the lymphatics appear to be, at least, as active as the blood-vessels. An ulcer is a chasm formed on the surface of the body by the removal of parts back into the system by the action of the absorbents. At first, it may be difficult to conceive how a part of the body can be removed by itself; but there is not more difficulty in conceiving this, than how the body can form itself. Both facts are equally well confirmed. When it becomes necessary that some whole living parts should be removed, it is evident, says Mr. Hunter, that nature, in order to effect this object, must not only confer a new activity on the absorbents; but must throw the part to be absorbed into a state which yields to this operation. The absorption of whole parts in disease, arises from five causes; pressure; irritation of stimulating substances; weakness; inutility of parts; death of them. (*Hunter on Inflammation, &c. p.* 442—446.)

Ulceration takes place much more readily in the cellular and adipose substance, than in muscles, tendons, ligaments, nerves, and blood-vessels. Hence, in the progress of pus to the surface of the body, ulceration often takes a circuitous course for the purpose of bringing the matter to the skin. The skin itself, also, being highly organized, considerably retards the bursting of abscesses. On the same account, when ulceration is spreading, the edges of the skin hang over the ulcerated surface. (*Hunter, p.* 447.)

New-formed parts, such as cicatrices, callus, and all adventitious new matter, such as tumours, readily admit of being absorbed. The adventitious matter, indeed, is more prone to be absorbed than that which is a substitute for the old. Mr. Hunter explained this circumstance on the principle of weakness.

When ulceration takes place, in consequence of the death of an external part, it occurs first on the outer edge, between the dead and living substance.

Abscesses constantly make their way to the surface of the body by ulceration; but as some textures more readily admit of being absorbed than others, the matter often follows a circuitous course, before it can arrive at the skin. (*Hunter, p.* 448, 449.)

A tumour, when it makes equal pressure in every direction around, will only make its way in an external course, because what Mr. Hunter termed interstitial absorption happens in no other direction. (*P.* 449.)

The parts which are situated between an abscess, or any extraneous substance, and the nearest surface, are those which are most susceptible of ulceration. This is one of the most curious phenomena connected with the process under consideration. It shows that there is a principle in the human body, by which parts are always prone to free themselves from disease. Slight pressure from without will often produce a thickening of parts, and hence Mr. Hunter remarks, there even appears to be a corresponding backwardness to admit disease. (*P.* 449.) Both these facts, he observes, are shown in the case of fistula lachrymalis; for though the matter is nearest the cavity of the nose, still it makes its way externally, by means of ulceration, while the Schneiderian membrane even becomes thickened, so as to become a barrier against the progress of the disease inward. (*P.* 451.)

There is one difference between the advancement of an encysted tumour to the surface of the body, and the progress of an abscess in the same direction, viz. that the former does not excite ulceration of the cyst: but an interstitial absorption of the sound parts between the cyst and skin, till the cyst and external skin come into contact, at which period inflammation takes place, and absorption becomes accelerated into ulceration. In an abscess, the progressive ulceration begins in the cyst, at the same time that the interstitial absorption in the sound part covering the matter is going on. (*P.* 452—457.)

The action of progressive absorption is to remove surfaces contiguous to irritating causes, which Mr. Hunter referred to pressure, irritation, and weakness. In cases of tumours, pressure becomes a cause. The buttocks and hips of persons who lie long on their backs, often ulcerate. The heels of many patients, with fractures, who lie for a great while in the same position, are apt to ulcerate. In the latter instances, Mr. Hunter conceived that ulceration is a substitute for mortification, and is at the same time, a proof of a certain degree of strength; for if the patient's constitution were very weak, the same parts would mortify. (*P.* 453.) That pressure is a frequent cause of ulceration, is also evinced by the occasional effects of chains on prisoners, and harness on horses.

That irritating substances produce ulceration, needs no illustration.

Progressive absorption may occur either with or without suppuration. We have instances of the latter in cases of extraneous bodies, which travel about the body without producing irritation enough to give rise to the secretion of pus. In the progress of aneurisms of the aorta, and of fungous tumours of the dura mater to the surface, the same fact is also illustrated. (*P.* 455.)

Absorption with suppuration, in other words, ulceration either happens in consequence of suppuration already begun, in which event the pus acts as pressure; or else absorption attacks external surfaces from particular irritations or weakness, in which case suppuration must follow. (*P.* 456.)

The production of ulceration requires much greater pressure from without than from within. The process is always disposed to take place more quickly, when near the surface of the body, and its progress becomes accelerated in proportion as it arrives near the skin.

The adhesive inflammation precedes the suppurative, and prevents the pus from becoming diffused, as soon as it is secreted, and when the cyst afterward ulcerates, in order to let the matter approach the skin, the adhesive inflammation still continues to go before the ulcerative process, and thus prevents the matter from insinuating itself into the interstices of the cellular substance. (*P.* 457.)

The pain of ulceration is, in some degree, proportioned to its quickness. When ulceration begins on a surface, or takes place for the purpose of bringing matter to the skin, the pain is always considerable. When ulceration takes place, in order to separate a dead part, as in sloughing, exfoliations, &c. there is seldom any particular pain. (*P.* 459.)

The ulcerating sore always exhibits little cavities, while the edge of the skin is scalloped, and thin, at the same time turning a little out, and overhanging, more or less, the ulcerated surface. The face of the sore appears foul, and the discharge is very thin.

When ulceration stops, the edges of the skin become regular, smooth, a little rounded, or turned in, and of a purple colour, covered with a semi-transparent white. (*Hunter on Inflammation, &c. p.* 460.)

The reader, desirous of further information, should particularly consult this last publication, and *Professor Thomson's Lectures on Inflammation, p.* 349, *&c.*

ULCERS. Surgeons usually define an ulcer to be a solution of continuity in any of the soft parts of the body, attended with a secretion of pus, or some kind of discharge.

In the present part of this Dictionary, there will not be occasion to speak of several kinds of sores, which have been treated of in other articles. (See *Cancer, Scrofula,* and *Venereal Disease.*)

Ulcers are divided into *local* and *constitutional.* As Professor Thomson has well observed, however, it is only within certain limits, that this distinction is well founded; for an ulcer, which is at first completely local, may in time affect the system, so as to become constitutional; and ulcers which derive their origin from some general affection of the system, may remain after the removal of the constitutional disorder, by which they were originally produced. (*Lectures on Inflammation, p.* 427.)

"Ulcers (says Dr. Thomson) have usually been distinguished from each other by the causes by which they are induced, by the symptoms which they exhibit, and by the parts of the body in which they occur. The want of a disposition to heal in a suppurating surface may depend upon some specific action in the cause from which it proceeds, upon something peculiar in the constitution of the patient in whom it exists, or merely upon an improper mode of management: and hence, the distinction that has long been made of ill-conditioned sores, or ulcers, into those which are *specific* in their nature, and into those which are *simple.*

"Specific sores, or ulcers, may be occasioned by specific poisons, or by particular diatheses. The sores or ulcers which arise from specific poisons, may be either *local,* that is, confined, like a primary syphilitic ulcer, to one spot; or *constitutional,* that is, liable to occur in any part, texture, or organ, such as secondary syphilitic ulcers. Of diatheses, predisposing to ulcers, we have examples in the scrofulous, scorbutic, and arthritic diatheses, and also in the syphiloid diatheses, or that which arises not unfrequently in those who have had syphilis, from the too free and injudicious use of mercury.

"Every ulcer, strictly speaking, is of a local nature; but there are ulcers, which, though necessarily local in their appearance, are connected with, or dependent upon, diseases, which affect the general system. These ulcers ought to be regarded as modifications of, or forms in which the diseases appear, with which they are connected. Considered in this light, it is obvious, that specific ulcers can be treated of with propriety, only under the head of the diseases to which they respectively belong.

"We call those sores, ulcers, *simple,* which do not appear to proceed from any specific disease, or morbid diathesis existing in the constitution of those, in whom they take place. They are usually solitary occurrences, and the consequences of accidental injuries, and improper modes of management. They may occur in every part of the body, but they appear most frequently upon the lower extremities."

Professor Thomson afterward remarks, that "the appearances, which different ulcers exhibit, seem, at first view, to afford an excellent foundation for distinctions among them, and so they undoubtedly do in many respects."

"But (says he) it is to be regretted, that the characters, upon which the distinctions of ulcers, as well as of many other local diseases, are founded, are neither very uniform in their appearance, nor are very easily distinguishable from one another. Not only are the local appearances which present themselves in simple ulcers liable to great variations in the different stages of the same individual affection, but they are often apparently the same with, or at least not easily distinguishable from, those which occur in specific diseases, and which require for their cure peculiar modes of treatment. It is this circumstance, which renders it so necessary for us, in endeavouring to distinguish and to cure ulcers, to avail ourselves of all the information, which we can procure from the history of the ulcer, from the nature of the exciting cause, by which it has been induced, and from the effects of the remedies which have been employed, as well as from the particular appearances, which the ulcer itself exhibits."

In noticing another ground of distinctions among ulcers, or that derived from the parts in which they occur, Dr. Thomson observes that "every texture and organ of the body possesses physical and vital qualities peculiar to itself; and these qualities must necessarily modify the appearances, which each texture and organ respectively exhibits in the state of disease. Specific diseases render some parts more liable than others to attacks of ulceration. Thus, secondary syphilis appears most frequently in the throat; scurvy in the gums; cancer in the lower lip; and lupous and scrofulous ulcerations in the upper lip, or in the nose. Cancer seldom or never appears primarily in the upper lip; but syphilis, when it attacks this part, puts on many of the appearances of cancer;" a fact, which Dr. Thomson says he first learned from Mr. Pearson. (See *Lectures on Inflammation, p.* 427—430)

In the valuable treatise on ulcers, published by Sir Everard Home, these complaints are divided into six principal kinds, viz.:

1. Ulcers in parts, which have sufficient strength to carry on the actions, necessary for their recovery.

2. Ulcers in parts, which are too weak for that purpose.

3. Ulcers in parts, whose actions are too violent to form healthy granulations, whether this arises from the state of the parts, or of the constitution.

4. Ulcers in parts, whose actions are too indolent, whether this arises from the state of the parts, or of the constitution.

5. Ulcers in parts, which have acquired some specific action, either from a diseased state of the parts, or of the constitution.

6. Ulcers in parts, which are prevented from healing by a varicose state of the superficial veins of the upper part of the limb.

Although I have chosen, in the subsequent columns, to adopt this nomenclature, I am perfectly aware of its being on some accounts objectionable, but especially because it assumes hypotheses, the truth of which can never be established, nor proved. This is one of the considerations, which have induced Professor Thomson to prefer the old names usually applied to ulcers; (*Op. cit. p.* 435, 438.) and he therefore treats of the *simple purulent ulcer; Inflamed ulcer; Fungous ulcer; Callous ulcer; Sloughing ulcer; Ulcerative ulcer; Carious ulcer; and Specific ulcers.*

OF ULCERS IN PARTS, WHICH HAVE SUFFICIENT STRENGTH TO CARRY ON THE ACTIONS NECESSARY FOR THEIR RECOVERY, SIMPLE PURULENT, OR HEALTHY ULCERS.

Sir E. Home remarks, that in this species of ulcer, the pus is of a white colour, thick consistence, and readily separates from the surface of the sore, and when diluted, and examined in a microscope, is found to be made up of small globules, swimming in a transparent fluid. The granulations are small, florid, and pointed at the top. As soon as they have risen to the level of the surrounding skin; those, next to the old skin, become smooth, and are covered with a thin, semi-transparent film, which afterward becomes opaque, and forms cuticle.

In the treatment of this kind of ulcer, it is only necessary to keep the surface clean, and prevent the natural processes from being interrupted. Sir E. Home observes, that this is in general best done by the application of dry lint, for the purpose of absorbing and retaining the matter, which serves as a soft covering for the granulations, and by putting over the lint a pledget of any simple ointment, in order to hinder the matter from evaporating, by which means the dressings will not become adherent, and may be easily taken off, as often as requisite.

Although healthy ulcers require no medicated application to be made to them, the dressings must be such as do not disagree with the granulations, or surrounding skin.

With some patients, a roller applied with moderate tightness, with a view of retaining the dressings, which cause uneasiness in the part, and make the ulcer lose its healthy appearance. Sir E. Home states, that he has seen several such cases, in which the proper appearance of the sore returned as soon as the bandage was discontinued.

In some patients, ointment irritates and inflames the neighbouring skin; and certain superficial ulcers will not heal, while kept in a moist state, and unexposed to the air; but heal, when allowed to become dry and covered with a scab.

Sir E. Home refers these particularities to constitutional causes, and not disease; for the ulcers heal as soon as the particular things, which disagree with them, are discontinued. These peculiarities in certain healthy sores may also attend others of a different description, and should always be discriminated from the effects of disease.

Sir E. Home very judiciously recommends inquiring of patients, who have previously had sores, what kind of applications they derived most benefit from, and what dressings were found to disagree.

TREATMENT.

1. Applications in the form of vapour, and fomentations, should never be employed, as they render the texture of the granulations looser, and diminish the disposition to form skin.

2. With respect to fluid applications, Sir E. Home also very properly condemns poultices, as well as fomentations. He speaks of alcohol as being an application, which promotes the formation of a scab, when this mode of cure is chosen.

3. In regard to ointments, their only use, in cases of healthy ulcers, is to keep the matter from evaporating. The most simple ointments are the best for the purpose; particularly the one composed of white wax, and olive oil.

Sir E. Home observes, that the great objections to the common simple ointments are, that they sometimes disagree with the skin, even when recent and free from all rancidity. When they have acquired the latter quality, they still more frequently create a greater degree of irritation.

4. With respect to applications in the form of powder, Sir E. Home remarks, that when it is desirable to form a scab on the ulcer, any inert powder may be sprinkled on the sore; but he prefers dry lint. Nothing should touch the powder, or lint; and to prevent this circumstance, Sir E. Home recommends applying a little bolster on each side of the sore, and over them a roller, which will go from one bolster to the other in the manner of a bridge.

For healthy ulcers, dry lint is to be regarded as being upon the whole the most eligible application. When the sore does not secrete pus enough in twenty-four hours to moisten the lint, the dressings are only to be changed every other day.

When a moderately tight bandage is not forbidden by constitutional peculiarities, it is useful both in supporting the muscles and skin, which are often in a flabby state from the unexercised state of the limb, and in defending the newly formed parts. (See *Home on Ulcers.*)

ULCERS IN PARTS WHICH ARE TOO WEAK TO CARRY ON THE ACTIONS NECESSARY FOR THEIR RECOVERY; THE OVERACTING ULCERS OF MR. BURNS; THE FUNGOUS ULCERS OF OLDER WRITERS.

This is the second of the classes, into which Sir Everard Home has divided ulcers in general.

The granulations of these sores are larger, more round on their external surface, and of a less compact texture, than those formed on ulcers in healthy parts. Sir E. Home has also noticed their semi-transparent appearance. When they have filled up the cavity of an ulcer to a level with the surface of the body, they do not readily form skin, but, rising up in a still higher manner, often lose altogether the power of producing new cutis. When the parts are still weaker, the granulations sometimes continue gradually to fill up the hollow of the ulcer, and then, all on a sudden, are suddenly absorbed, so as to leave the sore as deep as it was before.

Ulcers may be weak from the first, or become so in the progress of the case. Even granulations of the most healthy kind, if they are not skinned over in a certain time, gradually lose their primitive strength.

Sores on the legs are greatly under the influence of all natural peculiarities of the constitution, and every thing which affects the health. When the constitution becomes in the least weaker or stronger, the appearance of the granulation becomes changed accordingly, and this effect of constitutional weakness or strength on ulcers is greater, in proportion as the sores are further from the source of the circulation.

While the constitution is undergoing any kind of disturbance, the healing of an ulcer is suspended. Mental anxiety is very apt to retard cicatrization.

Such effects of the constitutional kind on ulcers are greater in weak and delicate persons, than in the strong and robust. Change of weather has considerable influence over the healing of sores. Sir E. Home mentions in proof of this fact, that when there were several hundreds of ulcers in the Naval Hospital at Plymouth, in 1778, every time the weather changed from a dry to a moist state, the ulcers universally assumed an unhealthy appearance; but put on a better aspect when the weather became dry again.

In the treatment of this kind of ulcer, tonics are to be exhibited, particularly bark and steel, and every thing which disagrees with the constitution is to be avoided. Wine and cordial medicines are also usually prescribed. Porter, however, is deemed better than wine for working people.

Sir E. Home observes, that the first object in the local part of the treatment, is to keep the granulations from rising above the edge of the surrounding skin. This gentleman (in my opinion) very judiciously represents the greater propriety of preventing the granulations from ever becoming too high by the employment of proper applications, than following the common plan of destroying the high granulations with escharotics, after they have risen to an improper height. There cannot be the smallest doubt, that if the granulations could always be prevented from rising too much the patient would suffer a great deal less pain.

Instead of applying to the surface of the ulcers, now under consideration, lunar caustic, blue vitriol, red precipitate, &c. Sir E. Home prefers mixing these escharotics with other substances, so as to render them only strong stimulants, and using them in this latter form. He conceives, that when the high granulations are destroyed with escharotics, the disposition of the surface underneath to reproduce them is increased, but that this is not the case when the luxuriant parts are only stimulated, so as to become absorbed.

The same gentleman seems to think, that

when animal substances grow with great rapidity, they are, like vegetable ones, weaker than when produced in a slower manner. Hence Sir E. Home is of opinion, that the growth of granulations ought to be checked in the early stage of their formation, by some resistance which they are just able to overcome, under which circumstances they derive strength from the limited increase of action which they are obliged to undergo.

On the same principle, according to Sir E. Home, the pressure of tight bandages is advantageous, and ulcers which heal while the patient is walking about, are not so apt to break out again as others healed while the parts are in a state of perfect rest.

In the treatment of these ulcers, when the granulations have come to a proper height, and do not form a thin, semi-transparent pellicle upon their surface, they are to be considered as weak parts, and treated accordingly. Sir E. Home thinks, that in this circumstance, the best plan, when no particularity of constitution forbids, is pressure, made with a thin piece of lead over the dressings, and supported with a tight bandage.

OF APPLICATIONS TO ULCERS ATTENDED WITH WEAKNESS.

Although strictly we have no topical applications which can directly communicate strength to granulations, there are certainly some which prevent the granulations from exhausting themselves by luxuriant growth, and stimulate them to draw more blood from the arteries; which effects, as Sir E. Home remarks, render such granulations stronger.

1. This gentleman very properly condemns, as applications to weak ulcers, all relaxing fomentations commonly employed; and recommends, instead of them, the use of spirits of wine, and the decoction of poppies, in equal proportions, not, however, to be applied hot.

2. With regard to moist applications, the same gentleman expresses his disapprobation of poultices, and mentions a weak solution of the argentum nitratum as the most eligible application in an aqueous form.

3. On the subject of powdered substances, as applications to weak ulcers, Sir E. Home says, he has often tried bark, and the lapis calaminaris, without perceiving that the former had any power of strengthening granulations, or the latter any virtue in disposing them to form new skin; properties commonly imputed to these applications.

Sir E. Home entertains no better opinion of plaster of Paris, or powdered chalk, employed with a view of promoting the formation of skin. Powdered carbon he speaks of as being more adapted to irritable, than weak ulcers. He praises powdered rhubarb, as particularly applicable to the latter kind of ulcer, because it represses the luxuriant growth of the granulations, renders them small and compact, and disposes them to form skin. When, however, the granulations have arisen above the level of the skin, it is not powerful enough to reduce them. When the rhubarb is too stimulating, it is to be mixed with a fourth part of crude opium in powder.

A piece of lint, a little less than the sore, is always to be put over the powder, and covered with a pledget of simple ointment.

4. Ointments, according to Sir E. Home, are particularly apt to disagree with weak ulcers. When other applications fail, however, greasy ones must be tried, and the above gentleman gives a preference to the ung. hydrarg. nitrat. mixed with hog's lard, in the proportion of one to five, or else to common cerate, blended with a small quantity of the hydrarg. nitrat. ruber.

OF ULCERS IN PARTS, WHOSE ACTIONS ARE TOO VIOLENT TO FORM HEALTHY GRANULATIONS, EITHER FROM THE STATE OF THE PARTS, OR THE CONSTITUTION: SIMPLE VITIATED ULCERS OF MR. B. BELL.

There are three states of the constitution influencing the nature of ulcers; an irritable state, in which all the actions of the animal economy are more rapid than in health; an indolent state, in which they are unusually languid; and, lastly, a diseased state, by which they are affected.

An irritable and an indolent ulcer cannot in general be distinguished from each other by mere appearances, though they may be so in a few instances. Sir E. Home informs us, that the disposition of an ulcer, like the disposition of a constitution, can only be accurately ascertained by determining the actions which arise from the different impressions made upon it.

The same gentleman notices, that the following appearances at once show the ulcer to be of an irritable kind. The margin of the surrounding skin being jagged, and terminating in an edge, which is sharp and undermined. The bottom of the ulcers being made up of concavities of different sizes. There being no distinct appearance of granulations, but a whitish spongy substance, covered with a thin ichorous discharge. Every thing that touches the surface gives pain, and very commonly makes it bleed. The discharge is altered from common pus to a thin fluid, in proportion to the degree of irritability communicated to the sore by constitutional causes.

The pain of an irritable sore in general gradually becomes less. When it is not constant, but comes on in paroxysms chiefly in the evening, or night-time, with great violence, convulsive motions of the limb are apt to occur, and extend to various other parts. Sir E. Home refers this symptom to irritation, communicated along the course of the nerves, and producing an action in them, attended with a violent contraction of the muscles, which they supply.

When the above-mentioned signs of an irritable ulcer are not present, we must form a judgment of the nature of the sore from listening to the history of the case, the effects of various applications, &c. When this kind of information cannot be obtained, Sir E. Home recommends the treatment to begin on the supposition of the ulcer being of an irritable nature.

When an ulcer occurs just over the malleolus externus, it is generally of an irritable kind, in consequence of the nature of the part on which it is situated, quite independently of any constitutional or local disposition to irritability. Sir E Home conceives, that the periosteum, which here lies immediately under the skin, becomes the seat of the ulcer, is the cause of its being very difficult to heal, and gives it the irritable appearance. The fact that sores, situated on the ligament of the patella, and over the periosteum of the anterior surface of the tibia, assume a similar appearance, and are equally difficult to heal, made the above gentleman more confirmed in his sentiment.

In treating ulcers in general, the surgeon will find it exceedingly advantageous to be acquainted with the effects of a great many external applications; for a very few cases will continue to heal beyond a certain time, without some alteration in the treatment. The necessity of changing the applications, after they have been continued for a certain time, is strikingly illustrated by the fact, that leaving off a powerful application, and employing one which at first would have had no effect, often does a great deal of service. When the change is made to a medicine of powers equal to those of the previous one, the benefit will be more lasting than in the preceding circumstance.

Sir E. Home compares the principle of this occurrence with that by which change of air, even of a very salubrious air, for one that is less so, often produces an infinite improvement of the health.

OF APPLICATIONS TO IRRITABLE ULCERS.

1. Sir E. Home recommends applications in the form of vapour as being particularly useful, by their quality of allaying irritation and soothing pain.

The steam of warm water is productive of benefit in this way, though seldom used by itself. Its good effects are increased when it is mixed with spirits.

Sir E. Home speaks also in favour of the benefit derived from fomentations containing opium; such as the tincture of opium sprinkled on flannel, wrung out of warm water; or the application of flannels, wet with a warm solution of the extract of opium, or with a decoction of poppy heads. A decoction of chamomile flowers, the tops of wormwood, or hemlock leaves, may also be employed for the same purpose.

Sir E. Home points out particular irritable ulcers, however, which are rendered more painful by warm applications; and he states, that the sores alluded to are generally attended with a mottled purple discoloration of the limb for some way from them, and a coldness of the lower part of the leg, and that they are often disposed to mortify, which event is promoted by warmth.

2. As for moist applications, the poultice made of linseed meal is the most simple, and most easily made; and as it does not necessarily require any addition of oil, is to be preferred, when this disagrees with the sore.

Sir E. Home does not say much in favour of the use of the extract of lead in poultices; for though he allows that it often answers very well, he adds, that it also frequently disagrees with the ulcer. and, if long used, is apt to bring on the lead-colic.

A decoction of poppy-heads is said to be a very good liquor for making poultices.

The carrot-poultice is also found to agree with a great many irritable sores.

The great objection to poultices in these cases being the weight of such applications, the limb should always, if possible, rest upon the poultice, and not the poultice upon the limb. When the weight cannot be avoided, and is hurtful, a lighter application should be chosen.

If poultices be employed, their use is to be continued as long as the granulations are small, and the ulcer is rapidly diminishing in size, and this even till the cicatrization is complete. When the granulations become large, and loose in their texture, poultices should be left off.

When the weight of poultices prohibits their use, Sir E. Home advises the trial of lint, dipped in one of the following lotions, and covered with a pledget of some simple ointment: a solution of the extract of opium; a decoction of poppies; the tincture of opium; a decoction of cicuta; the liquor plumbi acetatis dilutis; or a weak solution of the argentum nitratum.

3. Powdered applications are generally too stimulating for irritable ulcers. Carbon has been found useful; so has powdered extract of opium, mixed with an equal quantity of carbon, or linseed flour. However, opium occasionally affects the constitution, in consequence of absorption, and it has been known to excite violent inflammation, ending in mortification.

4. Ointments are not often proper applications for irritable ulcers, as they are always more or less rancid, and generally disagree with the skin of persons most subject to such diseases.

Sir E. Home mentions cream as being a very useful application, particularly in cases in which warmth is found to do harm. The same gentleman recommends, as a substitute for it, an ointment composed of hog's lard, purified by being repeatedly washed in spring water, and then mixed with a small quantity of white wax and rose water.

The observations made respecting the solutions of lead, apply to the unguentum cerussæ acetatæ.

5. The pressure of bandages is generally hurtful to irritable sores, though a slight degree of it proves serviceable to certain ulcers, which are somewhat less irritable, and arise from weakness.

OF ULCERS IN PARTS, WHOSE ACTIONS ARE TOO INDOLENT TO FORM HEALTHY GRA-

NULATIONS, WHETHER THIS INDOLENCE ARISES FROM THE STATE OF THE PARTS, OR OF THE CONSTITUTION: THE CALLOUS ULCERS OF SEVERAL WRITERS.

Such is the next division of ulcers adopted by Sir E. Home, in his treatise on the subject. The indolent ulcer forms in its appearance a complete contrast to the irritable one. The edges of the surrounding skin are thick, prominent, smooth, and rounded. The surface of the granulations is smooth and glossy. The pus, instead of being of a perfect kind, is thin and watery, being composed of a mixture of pus and coagulating lymph. The lymph consists of flakes, which cannot be easily separated from the surface of the sore. The bottom of the ulcer forms quite a level, or nearly so; and, as Sir E. Home very accurately remarks, the general aspect conveys an idea, that a portion of the skin and parts underneath has been for some removed, without the exposed surface having begun any new action to fill up the cavity.

When, however, the indolence of the ulcer is not so strongly marked, the sore does not correspond to the preceding description, but resembles in appearance the ulcer, which possesses an inferior degree of irritability, and can only be discriminated from it by receiving no benefit from smoothing applications.

The odd circumstance of some indolent sores having the appearance of irritable ones, is, in some degree, explained by ulcers always being influenced by changes in the constitution, and accidental circumstances affecting the parts.

Most of the ulcers, which are to be seen in the London hospitals, are of the indolent kind. An indolent disposition in the ulcer may proceed altogether from the long existence of the disease; and hence, Sir E. Home very justly observes, it is immaterial whether at first it was healthy, weak, or irritable, for, if not cured within a certain time, it becomes indolent, with the exception of a few of the irritable kind, which never change their nature.

Indolent sores do form granulations; but these, every now and then, are all on a sudden absorbed, and, in the course of four and twenty hours, the sore becomes as much increased in size, as it had been diminished in as many days, or weeks. This absorption of the granulations arises principally from their not being of a healthy kind; but the event is promoted by changes in the weather, anxiety, fatigue, &c.

The object in the treatment of indolent ulcers is not simply to produce a cure, but to render such cure as permanent as possible. This can only be accomplished by altering the disposition of the granulations, and rendering them strong enough to stand their ground after the ulcer is filled up.

When an ulcer, which has existed six months, is dressed with poultices for a week, the granulations, at the end of this time, will partly have filled up the hollow of the sore, but they will present a large, loose, and glossy appearance. Should the poultice be now discontinued, and some proper stimulating application used for another week, the granulations will be found, at the expiration of this time, to have become smaller, more compact, redder, and free from the glossy appearance. The ulcer, when healed by the latter application, will not be so likely to break out again, as when healed with large, loose, flabby, glossy granulations.

Sir E. Home states, that the number of indolent sores, which heal under the use of stimulating applications, and do not break out again, compared with similar cases, treated with mild dressings, are as four to one.

APPLICATIONS TO INDOLENT ULCERS.

1. Medicines in the form of vapour cannot heal indolent sores, so as to accomplish a lasting cure. It is only when these ulcers assume a foul appearance, and are in a temporary state of irritation, that such applications can be advantageously employed.

In general, patients, on their first admission into hospitals with sore legs, have their ulcers in a temporary state of irritation from neglect, exercise, excesses, &c. Hence, it is generally found advantageous, for the first few days, or even a week, to have recourse to poultices and fomentations.

I believe, that any common fomentation, whether of chamomile, poppy-heads, or mere warm water, answers equally well. The time for using it is while a fresh poultice is preparing, and this latter application should be changed twice a day.

2. Moist applications, such as poultices, are to be employed when fomentations are proper, and they may be made of bread, oatmeal, or linseed.

Sir. E. Home describes a species of indolent ulcers, which occur in patients of debilitated constitutions, which put on a sphacelated appearance, without any apparent cause, even after they have made some progress towards a cure, and in this way spread to a very large size. Some of these ulcers, if judged of from their appearances, would be ranked as irritable ones; but, as soothing applications do not agree with them, they are not to be classed with the latter kind of sores. They are said to occur particularly in seamen and soldiers, who have been long at sea, and have been termed *scorbutic* ulcers. Sir E. Home represents them, however, as not being necessarily connected with the scurvy, and being often met with in patients who have not been on the sea. He states that they are not of necessity joined with any specific disease; but are common to all kinds of patients, whose constitutions have been impaired either by salt provisions, warm climates, or drinking.

From some trials first made by Dr Harness, and afterward by Sir E. Home, it appears that these particular ulcers, when in a sphacelated state, are benefited by employing the gastric juice of ruminating animals, as an external application. It makes the sloughs fall off; and the sore assume a better appearance. Some pain follows on its being first applied, and it is to be regarded as a stimulating application.

Sir E. Home mentions, that in the West Indies such ulcers are advantageously dressed with the fresh root of the cassada, grated into a pulp. Lime-juice has also been found a useful application, and solutions of vitriol and alum have been recommended.

When indolent ulcers are not attended with certain peculiarities, a solution of the argentum nitratum is one of the best of the watery applications. It stimulates the granulations, and makes them put on a more healthy appearance, and its strength may be increased according to circumstances. An ulcer, which at first cannot bear this solution above a certain strength without pain, and without the granulations being absorbed, becomes able, after the application has been used, about ten days or a fortnight, to bear it twice as strong, without such effects being produced: a proof of the granulations having acquired strength.

The tincture of myrrh is often employed as an application to indolent ulcers. Hunezowsky has praised a decoction of the walnut-tree leaves, and soft covering of the walnut, for the same purpose. (*Acta Acad Med. Chir. Vindob. T.* 1, 1788.) Sir E. Home gives his testimony in favour of both the latter dressings.

Diluted sulphuric acid, and the expressed juice of the pod of different species of pepper in a recent state, are mentioned by Sir E. Home as having been used as applications to indolent ulcers: the latter one in the West Indies.

This gentleman recommends also a scruple of nitrous acid, mixed with eight ounces of water, as a very useful medicine for external use. The strength must be increased or diminished, according to circumstances. Sir E. Home has found that this application promotes, in a very uncommon manner, the progress of the cure.

The first application of diluted nitrous acid gives a good deal of pain, which lasts about half an hour, and then goes off.

When an indolent ulcer heals with the diluted nitrous acid, the process of skinning is accomplished with more rapidity than when other applications are employed; and the new skin is said to be more completely formed. The acid coagulates the pus as soon as it is secreted.

Sir E. Home states, that several patients, who had ulcers dressed with the diluted nitrous acid, were allowed to walk about, without finding the progress of the cure retarded, although no bandage to support the limb was made use of. This gentleman informs us, also, that in ulcers of the leg, attended with an exposure of a piece of bone, which retards the cure, because it does not exfoliate, and come away, the application of diluted nitrous acid to the bone removes the earthy part, and excites the absorbents to act upon the remaining animal portion.

3. The only application, in the form of powder, adapted to indolent ulcers, is, according to Sir E. Home, the hydrargyrus nitratus ruber. It may be occasionally used for ulcers of the most indolent kind.

4. Ointments are represented as being particularly good applications for indolent sores.

The idea of the air having bad effects on sores, which are exposed to it, is now disbelieved. That air has no irritating property of this kind is proved by the fact, that, when the abdomen of an animal is filled with it, no inflammation is excited. When the cellular membrane is loaded with it, in cases of emphysema, the parts do not afterward inflame. Nor do ulcers in the throat, as Sir E. Home justly remarks, heal less favourably than others, although they are of necessity always exposed to the air.

Whatever ill effects arise, may probably be explained by the consequences of evaporation, which converts the soft pus into a scab. The granulations are, in all probability, most favourably circumstanced when they are covered with their own matter, which should only be now and then removed, in order that such applications may be made as will stimulate them to secrete a more perfect pus. From what has been just stated, it must be obvious that indolent ulcers should not be frequently dressed, and that if they are so, and the dressings are stimulating, the practice will do harm. Changing the dressings once in twenty-four hours is deemed quite sufficient, unless the quantity of matter be very great, which seldom happens.

One part of the unguentum hydrargyri nitrati, mixed with three of hog's lard, is one of the best applications. Its strength, however, must be increased after being used for some time, as a dressing for the same ulcer.

The unguentum hydrargyri nitrati has the effect of quickly removing the thickness of the edges of indolent ulcers, and the surrounding dark red colour of the skin. It seems also to have particularly great power in making the granulations become small and healthy, and, of course, the ulcer less likely to break out again.

With some ulcers, however this ointment is found to disagree.

The unguentum resinæ flavæ, and the unguentum elemi, mixed with the balsam of turpentine, or that of copaiba, are other common applications to indolent sores. Sir E. Home states, that the resins and turpentines are not so powerful as the acids and metallic salts in giving the granulations a healthy appearance, and a disposition to resist being absorbed.

Cases, attended with a degree of indolent thickening, are such as are most likely to be improved by camphorated ointments.

In numerous cases, the applications, whatever they are, soon lose their effect; and others should then be substituted for them. The past and present states of the sore are always to be considered. Although the ulcer may be in its nature indolent, it is liable to temporary changes from constitutional causes; and hence a temporary alteration in the treatment becomes proper.

5. Bandages are undoubtedly of the most essential service in healing many kinds of ulcers; but their efficacy is so great in curing numerous indolent sores, that they are sometimes considered the principal means of cure. But among modern advocates for rollers Mr. Whately is one of the most zealous. While this gentleman acknowledges that the efficacy of *pressure* in counteracting the effects of the dependent posture was known to Wiseman, who recommended the use of the laced stocking for this purpose, he conceives that the effects of pressure, in the cure of ulcers on the extremities, previously to the appearance of Dr. Underwood's treatise, were not duly insisted upon by surgical writers. However, he confesses, that there always have been practitioners, who were acquainted with the importance of this mode of treatment, and adopted it in their practice. He then criticises the work of Sir Everard Home, in which, it is remarked, that the effect of pressure is not much relied upon for the cure of these complaints. Indeed, says Mr. Whately, it is stated in that book, not only that no benefit is derived from compression in several species of these ulcers, but that many ulcers are rendered worse, more painful, and more unhealthy in their appearance by its use; truths which it would be impossible for Mr. Whately to refute. They are, I conceive, admitted by himself, when he observes that there are certain conditions of an ulcer which will not bear compression. Whether Sir Everard Home has not given a sufficiently favourable account of the effects of pressure in the cure of ulcers of the leg, I will not presume to determine. Perhaps he may not have insisted so much upon this treatment as it deserves; but I can find no fault with him for speaking of it as *frequently* injurious, because the fact is notorious.

In the cases, published in Mr. Whately's essay, *very little variety of dressing was used;* pressure being the principal means of cure, with some exceptions particularly specified in the work.

"I cannot doubt (says Mr. Whately) that the practice here recommended must in the end, prevail, notwithstanding it has this great obstacle to contend with, that surgeons must condescend, for the most part, to apply the bandages with their own hands. The clumsy and ineffectual manner, in which this business is too frequently done, can never be expected to produce the desired effect. I am certain, that if the necessary pains be taken, according to the directions here laid down, such effects will uniformly follow, as must convince the unprejudiced mind, that to have recourse to the operation of tying varicose veins, and the application of a great variety of remedies, can be *very rarely*, most probably *never* necessary. I can safely declare, that all such cases as are described by Sir E. Home to be cured by this operation, have readily yielded under the proper management of pressure alone."

With respect to Mr. Baynton's mode of treatment, while Mr. Whately regards it as a confirmation of the principles insisted upon in his own tract, he considers the plan of making the pressure with adhesive plaster inconvenient, and on several accounts objectionable. In every case related by Mr. Baynton, he is sure that the proper application of compresses and flannel rollers, would have produced similar good effects. The instances of success by this method, after the supposed failure by the roller, he attributes to the pressure made with the plasters, having been applied with Mr. Baynton's own hands, whereas that with the roller was probably so made, that the effect intended by it could not possibly be obtained. No surgeon, he observes, who will not be at the trouble of applying the roller and compresses himself, can be a judge of what may be effected by the proper management of them.

The following is the calamine cerate, which Mr. Whately has usually employed.

℞. Axung. Porcin. depur. lib. iij.
Empl. Plumbi. lib. iss.
Lap. Calam. præp. ap. lib. j. M.

"To this formula, (says Mr. Whately) I shall add another for making a cerate, which nearly resembles the unguentum tripharmicum of the old Dispensatory, but being less oily, it makes a much more adhesive plaster. It should be spread on rag, or silk, as an external covering to the dressing on lint, where a tow plaster cannot be conveniently used, as in wounds of the face or hands, a bubo, or any other sore, where an external plaster cannot be readily retained in its situation by a bandage. This plaster is likewise so mild, that it never irritates the skin. I have found it also a very useful plaster in fractures. The following is the formula:

℞. Empl. Plumbi. lib. j.
Axung. Porcin. depur. unc. vj.
Aceti unc. iv. M."

With respect to the proper method of applying the roller and compresses, Mr. Whately offers the following remarks:

"The best width for a flannel roller, designed for those who have slender legs, is three inches; but for those whose legs are of a large size, they should always be three inches and a half in width. They must therefore be at first torn a little wider, that they may be of their proper width when repeatedly washed. It will likewise be found, that rollers made of fine, soft, and open flannel, will answer much better than those made of coarse or hard flannel.

"For those who have full-sized legs, the length of six yards is but just sufficient to answer all the purposes intended by a roller; but in those who have very small legs, five yards is a sufficient length. Care should be taken that the rollers be washed in very hot water, and they should be hung up to dry immediately on being washed. If these precautions be not attended to, repeated washing them will, in some kinds of flannel, make them as narrow as tape, by which they will be rendered almost useless. They should be often washed, as they are much softer, and of course sit easier, when quite clean than when they are soiled.

"In applying a roller, (says this gentleman) the first circle should be made *round* the *lowest* part of the ankle, as near as possible to the heel; the second should be formed from thence round the foot; the third should be passed again round the foot quite to the toes. The roller should then be passed from the foot round the ankle and instep a second time to make the fourth circle. In doing this, it should be brought nearer (but not over) the point of the heel than it was at the *first time* of going round this part. The fifth circle should pass over the ankle again, and not more than half an inch higher up the leg than the fourth circle. The sixth, seventh, eighth, and ninth circles should ascend spirally along the small of the leg, at the *exact distance* of three-fourths of an inch from each other. Having proceeded thus far up the leg, we may begin to increase the distances of the circles from each other: they may succeed each other upward to the knee at the distance of from one to two inches, according to the size and shape of the leg. At that part where the calf of the leg commences, it is generally necessary to let the upper edge of the roller be once, twice, or thrice turned downwards for about half the circumference of the leg, in order to make the roller lay smooth between the middle of the calf and the small of the leg. When the roller has been thus applied as far as the knee, there will be a portion of it to spare, of perhaps a yard in length; this remainder should be brought down by spiral windings, at greater distances from each other than those which were made on the ascent of the roller. The windings should in general be completed in the small of the leg, where the roller should be pinned.

"In *many* cases, it is necessary to apply the roller *over* the *heel*. It should be brought as low as possible round the ankle; as in the former description. From thence, the second circle of the roller should pass from the instep over one side of the heel, and be brought over the other side of the heel to the instep again. The third circle should be passed round the ankle a second time, but still nearer to the heel than the first circle was. The roller should after this be brought back to the foot, and passed round it to make the fourth circle. A fifth circle should be again made (though it is not in all cases absolutely necessary) round the foot, to the toes. To make the sixth circle, the roller should be brought back, and passed round the ankle again. The seventh, eighth, ninth, tenth, and eleventh circles should ascend spirally at the *exact distance* of three-fourths of an inch from each other; these distances commencing at the sixth circle. The roller should then be carried to the knee, and be brought down again to the small of the leg, as described in the former instruction.

"In applying the compresses, it is necessary in every instance to put them on one by one, and not all in a mass, though they be of a proper size and number. They should be crossed in different directions; the largest of them should in no case be longer than just to meet on the opposite side of the leg to which they are applied. I have in many instances seen the compresses applied by the patients of such a length as to go round the leg like a roller, and be fastened together with pins. This method generally wrinkles and blisters the skin, and by no means answers the purpose of making a compression on the part where it is most wanted. I never suffer a pin to be used in the compresses. If the same compresses in any case be applied two days together, they should always be turned on the contrary side at each reapplication, in order to prevent wrinkles on the skin."

Mr. Whately notices two objections made by Mr. Baynton to rollers. "The first is, that it is difficult to retain the roller on the parts to which it is applied; the second is, that it gives pain to the patient." Mr. Whately's experience, however, warrants him in saying, that a flannel roller will, in almost every instance, keep the exact position in which it was first placed, for a much longer time than is necessary. "I have seen these rollers (says Mr. Whately) many hundred times keep their situations without any variation whatever for two days; and that too without the least restraint upon exercise. This has happened in those cases where, from the distance of the patient, or from the circumstance of his being nearly cured, I have wished to dress the leg only every forty-eight hours. I must go a step further, and observe, that I have seen repeated instances in which these rollers have remained in their situation for three or four days, and even nearly for a week without being applied afresh. In short, it is one of the best properties of a flannel roller, that it is easily retained in its situation when well applied. In *every* instance in which it is necessary to use one, I could pledge myself to apply it in such a manner, as should prevent its altering its position for two days. The method I should use, I have already described; in addition to which nothing more would be necessary, even in those cases where the shape of the leg is peculiarly unfavourable to the retention of a bandage, than the insertion of a few pins.

"In answer to the second objection, I observe, that I have invariably found, that when a flannel roller has been applied in the manner here described, and has not been drawn unnecessarily tight, it gives no pain. It sits nearly as easy as a common stocking, and allows a very free motion and exercise of the limb." (See *Practical Observations on the Cure of Wounds and Ulcers on the Legs, without rest; by Thomas Whately,* 1799.)

6. I shall next introduce an account of

Mr. Baynton's plan of curing old ulcers of the leg, by means of adhesive plaster. Were I to say, that any particular method of dressing such sores is entitled to superior praise, I should certainly decide in favour of this gentleman's practice. I have seen it most successful myself, and I hear it highly spoken of by numerous professional friends, in whose unprejudiced judgment I place much reliance.

Mr. Baynton acquaints us, that the means proposed by him will be found, in most instances, sufficient to accomplish cures in the worst cases, without pain or confinement. After having been repeatedly disappointed in the cure of old ulcers, Mr. Baynton determined on *bringing their edges nearer together by means of slips of adhesive plaster*. To this he was chiefly led, from having frequently observed, that the probability of an ulcer continuing sound, depended much on the size of the cicatrix which remained after the cure appeared to be accomplished; and from well knowing that the true skin was a much more substantial support and defence, as well as a better covering than the frail one, which is obtained by the assistance of art. But when he had recourse to the adhesive plaster, with a view to lessen the probability of those ulcers breaking out again, he little expected that an application so simple would prove the easiest, most efficacious, and most agreeable means of treating ulcers.

Although the first cases in which Mr. Baynton tried this practice, were of an unfavourable nature, yet he had soon the satisfaction to perceive that it occasioned very little pain, and materially accelerated the cure, while the size of the cicatrices were much less than they would have been, had the cures been obtained by any of the common methods.

At first, however, the success was not quite perfect; as, in many instances, he was not able to remove the slips of plaster, without removing some portion of the adjacent skin, which, by occasioning a new wound, proved a disagreeable circumstance in a part so disposed to inflame and ulcerate, as that in the vicinity of an old sore. He therefore endeavoured to obviate that inconvenience by keeping the plasters and bandages well moistened with spring-water, for some time, before they were removed from the limb. He had soon the satisfaction to observe, that the inconvenience was not only prevented, but that every succeeding case justified the confidence he now began to place in the remedy. He also discovered, that moistening the bandages was attended with advantages which he did not expect: while the parts were wet and cool, the patients were much more comfortable, and the surrounding inflammation was sooner removed, than he had before observed it to be.

By the mode of treatment here recommended, Mr. Baynton found that the discharge was lessened, the offensive smell removed, and the pain abated in a very short time. But, besides these advantages, he also found that the callous edges were in a few days level with the surface of the sore; that the growth of fungus was prevented, and the necessity of applying painful escharotics much lessened, if not entirely done away. Mr. Baynton gives the following description of his method.

"The parts should be first cleared of the hair, sometimes found in considerable quantities upon the legs, by means of a razor, that none of the discharges, by being retained, may become acrid, and inflame the skin, and that the dressings may be removed with ease at each time of their renewal, which, in some cases where the discharges are very profuse, and the ulcers very irritable, may perhaps be necessary twice in the twenty-four hours, but which I have, in every instance, been only under the necessity of performing once in that space of time.

"The plaster should be prepared by slowly melting, in an iron ladle, a sufficient quantity of litharge plaster, or diachylon, which, if too brittle when cold, to adhere, may be rendered adhesive by melting half a dram of resin with every ounce of the plaster: when melted it should be stirred till it begins to cool, and then spread thinly upon slips of smooth porous calico, of a convenient length and breadth, by sweeping it quickly from the end held by the left hand of the person who spreads it, to the other, held firmly by another person, with the common elastic spatula used by apothecaries; the uneven edges must be taken off, and the pieces cut into slips about two inches in breadth, and of a length that will, after being passed round the limb, leave an end of about four or five inches. The middle of the piece so prepared is to be applied to the sound part of the limb, opposite to the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the lower edge of the sore, and the ends drawn over the ulcer with as much gradual extension as the patient can well bear; other slips are to be secured in the same way, each above and in contact with the other, until the whole surface of the sore and the limb are completely covered, at least one inch below, and two or three above the diseased part.

"The whole of the leg should then be equally defended with pieces of soft calico, three or four times doubled, and a bandage of the same, about three inches in breadth, and four or five yards in length, or rather as much as will be sufficient to support the limb from the toes to the knee, should be applied as smoothly as can be possibly performed by the surgeon, and with as much firmness as can be borne by the patient, being first passed round the leg at the ankle joint, then as many times round the foot as will cover and support every part of it, except the toes, and afterward up the limb till it reaches the knee, observing that each turn of the bandage should have its lower edge so placed as to be about an inch above the lower edge of the fold next below.

"If the parts be much inflamed, or the discharge very profuse, they should be well moistened, and kept cool with cold spring-water, poured upon them as often as the heat may indicate to be necessary, or perhaps at least once every hour. The patient may take what exercise he pleases, and it will be always found that an alleviation of his pain and the promotion of his cure will follow as its consequence, though under other modes of treating the disease, it aggravates the pain, and prevents the cure.

"These means, when it can be made convenient, should be applied soon after rising in the morning, as the legs of persons affected with this disease are then found most free from tumefaction, and the advantages will be greater than when they are applied to limbs in a swollen state. But at whatever time the applications be made, or in whatever condition the parts be found, I believe it will always happen that cures may be obtained by these means alone, except in one species of the disease which seldom occurs, but that will hereafter be described. The first application will sometimes occasion pain, which, however, subsides in a short time, and is felt less sensibly at every succeeding dressing. The force with which the ends are drawn over the limb must then be gradually increased, and when the parts are restored to their natural state of ease and sensibility, which will soon happen, as much may be applied as the calico will bear, or the surgeon can exert; especially if the limb be in that enlarged and compressible state which has been denominated the scorbutic, or if the edges of the wound be widely separated from each other."

Mr. Baynton afterward takes notice of the breaking of the skin near the ulcers; a circumstance which sometimes proved troublesome, and arose partly from the mechanical effect of the adhesive plasters, and partly from the irritating quality of the plaster. Mr. Baynton, however, only considers such sores of serious consequence when they are situated over the tendon of Achilles, in which situation they are sometimes several weeks in getting well. This gentleman recommends, with a view of preventing these ulcers, a small shred of soft leather to be put under the adhesive plaster.

Mr. Baynton next adds, "that cures will be generally obtained without difficulty by the mere application of the slips and bandage; but when the parts are much inflamed, and the secretions great, or the season hot, the frequent application of cold water will be found a valuable auxiliary, and may be always safely had recourse to where the heat of the part is greater than is natural, and the body free from perspiration." (See *A Descriptive Account of a new Method of treating old Ulcers of the Legs, Edit.* 2, 1799.)

One circumstance, strongly in favour of the advantages of the foregoing mode of treatment deserves particular notice: when M. Roux lately visited the London Hospitals, he had for the first time an opportunity of seeing this practice, which had never been tried in France. The plan appeared to him so different from every thing which he had been accustomed to see in his own country, where ulcers were almost always treated by rest in an horizontal posture, and emollient applications, that he left London somewhat prejudiced against the new method. Subsequently to his return to Paris, however, he has given it a fair trial, and experience has now entirely changed his opinion, as he has had the candour to acknowledge. (See *Rélation d'un Voyage fait à Londres en* 1814, *ou Parallèle de la Chirurgie Angloise avec la Chirurgie Françoise, par P. J. Roux, p.* 150.)

OF ULCERS ATTENDED WITH SOME SPECIFIC DISEASED ACTION, EITHER CONSTITUTIONAL, OR LOCAL.

1. *Ulcers which yield to Mercury.*

Here we shall exclude from consideration venereal ulcers, as this subject is treated of in the article *Venereal Disease.* At present we shall only notice such sores as are produced by other diseases of the general system, or of the parts, and are capable of being cured by mercury.

Perhaps there is no greater source of error in the whole practice of surgery, than the supposition that a sore, when it yields to mercury, must be of a syphilitic nature. Surgeons, however, who run into this absurdity, can hardly be imagined to be unaware that so potent a medicine must have effects on numerous diseases of very different descriptions. Sir E. Home accurately remarks, that many ulcers unconnected with the venereal disease, which receive no benefit from other medicines, heal under a mercurial course, or yield to mercurial applications. In some cases, the ulcer remains in the same state, while mercury is used; but begins to look better as soon as the medicine is discontinued, in consequence of the beneficial change produced in the system by the mercurial course. In these cases mercurial frictions are the best, because they occasion least impairment of the constitution, in consequence of the stomach continuing undisturbed, and capable of digesting well.

Another description of ulcers, noticed by Sir E. Home as deriving benefit from mercury, occur on the instep and foot, have a very thickened edge, and are attended with a diseased state of the surrounding skin, so as to bear some resemblance to elephantiasis. They are frequently observed affecting servants who live in opulent families in an indolent and luxurious way. Sir E. Home states, that fumigations with hydrargyrus sulphuratus ruber heal these ulcers, and resolve in a great degree the swelling of the surrounding parts. In some instances, an ointment of calomel and hog's lard; in others, the camphorated weak mercurial ointment, is the best application.

Many diseased ulcers, particularly those of a superficial kind, with a thickened edge, may be healed when they are dressed with a solution of one grain of the hydrargyrus muriatus in an ounce of water containing a little spirit.

2. *Ulcers curable by Hemlock.*

Sir E. Home places more reliance on hemlock as an external than an internal remedy for ulcers. The ulcers which usually receive benefit from hemlock applications, look like those of an irritable sort; but the surrounding parts are thickened in consequence of some diseased action. Such sores occur near the ankle, which joint is at the same time enlarged. Sometimes, but not so often, they take place over the ligaments of the knee. On account of their situation, and the swelling of the joint, they may be suspected to be scrofulous, though they are more sensible than strumous ulcers usually are. The sores just described are rendered less painful, their diseased disposition is checked, and the swelling of the joint diminished, by hemlock. Several irritable scrofulous ulcers are also particularly benefited by this medicine."

Sir E. Home gives the preference to hemlock poultices, unless their weight should be objectionable, in which case he advises lint to be dipped in a decoction of the herb, and put on the sore.

Of the ointment made with the inspissated juice, Sir E. Home says but little in regard to its efficacy.

3. *Ulcers curable by Salt-Water.*

Sir E. Home takes notice of other specific ulcers which yield to this application, after resisting other remedies. Poultices, made with sea-water, are often employed; but this gentleman seems to prefer keeping the part immersed in the water in a tepid state, about a quarter of an hour, twice a day.

When sea-water poultices bring out pimples, in cases of scrofulous ulcers on the legs and feet, Sir E. Home informs us that this disagreeable circumstance may be obviated by diluting such water with an equal quantity of a decoction of poppies. After a time, the salt water may be tried by itself again. While each fresh poultice is preparing, the part should also be immersed in such water warmed.

When there is a tendency to anasarca, or when there is an unusual coldness in the limb, unattended with any propensity to mortification, tepid salt-water may be used with infinite advantage.

4. *Ulcers curable by the Argentum Nitratum.*

Sir E. Home notices, under this head, an ulcer which does not penetrate more deeply than the cutis, but spreads in all directions, producing ulceration on the surface of the skin, and often extending nearly through its whole thickness. The part first affected heals, while the skin beyond is in a state of ulceration.

Of this description are, a leprous eruption, mostly seen in men impressed in Ireland; a disease of the skin induced by buboes, which have continued a great while after the venereal virus has been destroyed; and the ringworm.

All these diseases are most easily cured by applying to them a solution of the argentum nitratum.

The leprous eruption is communicated by contact, and makes its appearance in the form of a boil. This is converted into an ulcer, which discharges a fetid fluid, by which the surrounding skin is excoriated, and the ulceration is extended over a large surface. The pain is the most severe, and the discharge greatest, in hot weather. The parts first diseased heal, while others are becoming ulcerated, and the disease is always rendered worse by spirituous liquors, salt provisions, and catching cold.

Sir E. Home remarks, that the disease in the skin, produced by the effects of very irritable buboes, in constitutions broken down by mercury, is attended with ulceration of a more violent, deep, and painful kind, than the foregoing distemper. The progress of this disorder is, in other respects, very similar to that of the leprous eruption.

Although the ringworm only occurs in the form of an ulcer in warm climates, a mild species of the affection takes place in summertime in this country. It seems to be infectious; though it often occurs without infection. It commences with an efflorescence, which is attended with very trivial swelling, and spreads from a central point. The circumference of the efflorescence becomes raised into a welt, while the rest assumes a scurfy appearance. The welt becomes covered with a scab, which falls off, and leaves an ulcerated ring, in general, not more than a quarter of an inch wide. The outer margin of this ring continues to ulcerate, while the inner one heals, so that the circle becomes larger and larger. The discharge consists of a thin, acrid fluid, which seems to have a great share in making the disease spread.

For all the three preceding diseases, a solution of the argentum nitratum is strongly recommended by Sir E. Home.

5. *Ulcers which yield to Arsenic.*

The sores, which come under the definition of *noli me tangere* or *lupus*, derive great benefit from this powerful remedy. Sir E. Home observes, that they are nearly allied to cancer, differing from it in not contaminating the neighbouring parts by absorption, and only spreading by immediate contact.

From some cases, which fell under Sir E. Home's observation, he discovered, that arsenic was not only efficacious as an external, but also as an internal remedy. I shall not unnecessarily enlarge upon this subject in the present place, as the reader may refer to the articles *Arsenic*, *Cancer*, *Lupus*, *Hospital Gangrene*, &c. for additional information relative to the uses of this mineral in the practice of surgery.

Sir E. Home is an advocate for its employment, both internally and externally, for ulcers of untoward appearance on the legs. The *fungated* ulcer is particularly pointed out by this gentleman as being benefited by arsenic. This ulcer occurs on the calf of the leg, and on the sole of the foot. From its surface, a fungus shoots out, which is entirely different from common granulations. The new-formed substance is radiated in its structure, the bottom of the ulcer being the central point, and the external surface, which is continually increasing, the circumference. The substance of this fungus is very tender, and readily bleeds. The first stage of the disease sometimes has the appearance of a scrofulous affection of the metatarsal bones; but the parts seem more enlarged, and, when the skin ulcerates, a fungus shoots out, and betrays the nature of the case.

One species of the fungated ulcer is capable of contaminating the lymphatic glands; the other is not so. The first is represented by Sir E. Home as being incurable by arsenic, or any other known medicine.

The second yields to this remedy. Sir E. Home uses a saturated solution made by boiling white arsenic in water, for several hours, in a sand heat. He gives from three to ten drops internally; and, for outward use, dilutes a dram with two pints of water, making it afterward gradually stronger and stronger, till it is of double strength. The application may either be made in the form of a poultice, or of lint dipped in the lotion.

The best and safest preparation of arsenic, both for internal and external use, is the kali arsenicatum. The mode of employing it may be learnt by turning to the articles *Arsenic*, *Cancer*, *Potassa*, *Lupus*, &c.

6. *Ulcers attended with Varicose Veins.*

A certain kind of ulcer is very apt to occur on the inside of the leg, and is equally difficult to cure, and liable to break out again. It has the look of a mild, indolent sore; but, the branches and trunk of the vena saphena are enlarged, and this varix of the veins keeps the ulcer from healing. The sore is seldom deep, usually spreads along the surface, and has an oval shape, the ends of which are vertically situated. There is a pain affecting the limb rather deeply, extending up in the course of the veins, and exasperated by keeping the leg a long while in an erect posture.

This is a kind of ulcer, which derives immense benefit from a tight roller, applied from the toes to the knee, although the direct operation of the pressure of the bandage on the sore is itself productive of no particular good.

Sir E. Home found, however, that many patients could not bear to wear laced stockings, or tight bandages, and that others received no relief from them. Hence, this gentleman was led to consider what else could be done for the cure of the varicose state of the veins. He represents, that, in consequence of the size of the vena saphena, and its numberless convolutions, the return of blood from the smaller branches is so impeded, as to retard the circulation in the smaller arteries, and to interfere with their action in forming healthy granulations. The coats, and valves of the veins also become thickened, so that the latter parts (the valves) do not do their office of supporting the weight of the column of blood.

These reflections induced Sir. E. Home to think, that some benefit might be obtained by taking off a part of the pressure of this column of blood, by making a ligature round the vena saphena, where this vessel passes over the knee-joint. Thus the cavity of the vein at this part would be obliterated, and a kind of artificial valve formed.

This gentleman recommended the following way of performing the operation: "As the veins are only turgid in the erect posture, the operation should be performed while the patient is standing; and if placed upon a table, on which there is a chair, the back of the chair will serve him to rest upon; and he will have the knee-joint at a very convenient height for the surgeon. The leg to be operated upon must stand with the inner ankle facing the light, which will expose very advantageously the enlarged vena saphena passing over the knee-joint. While the patient is in this posture, if a fold of the skin, which is very loose at this part, is pinched up transversely, and kept in that position by the finger and thumb of the surgeon, on one side, and of an assistant on the other, this fold may be divided by a pointed scalpel, pushed through with the back of the knife toward the limb to prevent the vein being wounded; much in the same way as the skin is divided in making an issue. This will expose the vein sufficiently; but, there is commonly a thin membranous fascia confining it in its situation; and, when that is met with, the vein had better be laterally disengaged by the point of the knife. This is most expeditiously done by laying hold of the fascia with a pair of dissecting forceps, and dividing it; for it is difficult to cut upon parts, which give little resistance, and there is a risk of wounding the vein. After this a silver crooked needle, with the point rounded off, will readily force its way through the cellular membrane connected with the vein, without any danger of wounding the vessel, and carry a ligature round it. This part, or, indeed, what may be considered as the whole of the operation, being finished, the patient had better be put to bed, so as to allow the vein to be in its easiest state, before the ligature is tied, and then a knot is to be made upon the vein; this gives some pain; but it is by no means severe. The edges of the wound in the skin are now to be brought together by sticking-plaster, except where the ligature passes out, and a compress and bandage applied, so as to keep up a moderate degree of pressure on the veins, both above and below the part included in the ligature." (*Home on Ulcers*, *p.* 296. *Edit.* 2.)

It appears that A. Paré proposed and performed an operation, similar to that described by Sir E. Home. (The *Works of A. Paré, translated by Johnson: folio, p.* 319.) An account of Mr. Brodie's operation for the cure of varicose veins, and some additional remarks on the treatment of ulcers accompanied with varices, will be found in a subsequent article. See *Varicose Veins.* A description of what has sometimes been called the *hospital sore,* is given under the head of *Hospital Gangrene.*

For information on the subject of ulcers, consult *Michael Underwood's Treatise on Ulcers of the Legs, &c. 8vo. Lond.* 1783, *and Surgical Tracts: 3d edit.* 1799. *B. Bell, A Treatise on the Theory and Management of Ulcers, &c. New edit.* 8*vo.* 1791; *and his System of Surgery. J. Merk, De Curationibus Ulcerum difficilium præsertim in cruribus obviorum.* 4*to. Goett.* 1776. *Baynton's Descriptive Account of a new Method of Treating Old Ulcers of the Legs,* 1799, *ed.* 2. 8*vo. Bristol,* 1799. *Whately's Practical Observations on the Cure of Wounds and Ulcers on the Legs, without rest,* 8*vo. Lond.* 1799. *Practical Obs. on the Treatment of Ulcers on the Legs, to which are added, some Observations on Varicose Veins and Piles, by Sir Everard Home,* 1801, *edit.* 2. *Principles of Surgery, by John Bell, Vol.* 1. 1801. *Hunter on the Blood, Inflammation, &c. C. Curtis, An Account of the Diseases of India, &c. with Observations on Ulcers and the Hospital Sores of that country, &c.* 8*vo. Edinb.* 1807. *Brodie on the Treatment of Varicose Veins of the Legs, in Med. Chir. Trans. Vol.* 7, *P.* 195, *&c. Richerand, Nosographie Chir. T.* 1, *p.* 121, *&c. ed.* 4. *Boyer, Traité des Maladies Chir. T.* 2, *p.* 365. *&c. Paris,* 1815. *Roux, Voyage fait à Londres en* 1814, *ou Parallèle de la Chirurgie Angloise avec la Chirurgie Françoise, p.* 142, *&c. Paris,* 1815. *Dr. John Thomson's Lectures on Inflammation, p.* 423, *&c. Edinb.* 1813. *Dr. Dewar on the Treatment of Sinuous Ulcers, in Med. Chir. Trans. Vol.* 7, *p.* 482, *&c. The stages of several cutaneous affections, attended with ulceration, have been excellently described by Dr. Bateman in his valuable Synopsis of Cutaneous Diseases.*

UNGUENTUM ACIDI SULPHURICI.—℞. Acidi Sulphurici ʒj. Adipis Suillæ præparatæ ℥j.—These are to be well mixed together in a glass mortar.

This ointment has been used by Dr. Duncan, of Edinburgh, for curing the itch. It has the character also of being efficacious in the reduction of some chronic swellings of the joints; and when mixed with a good deal of camphor, it was rubbed upon the tumour, in cases of bronchocele, by Mr. Naylor, of Gloucester, with considerable effect.

As the sulphuric acid is particularly destructive of vegetable substances, the parts, to which this ointment is applied, should always be covered with flannel, instead of linen.

UNGUENTUM ANTIMONII TARTARIZATI.—℞. Antim. Tart. ʒj. Ung. Cetacei ℥j. Misce. The antimonial ointment, frequently used for exciting irritation of the skin, with the view of relieving diseases in the vicinity of the irritated part, as is exemplified in the treatment of some diseases of the eyes and joints, and a variety of indolent swellings.

UNGUENTUM CETACEI.—℞. Cetacei ʒvj. Ceræ Albæ ʒij. Olivæ Olei. fluid uncias tres. These are to be melted upon a slow fire, and then briskly stirred till cold. This ointment, spread on lint, serves as a simple dressing for wounds, ulcers, &c.

UNGUENTUM CERÆ CUM ACETO.—℞. Ceræ Albæ ℥iv. Olei Olivæ ℔j. Aceti Distillati ℥ij. The vinegar is to be gradually mixed with the two first ingredients, after these have been melted together. Dr. Cheston recommends this ointment for superficial excoriations, cutaneous eruptions, &c.

UNGUENTUM CONII.—℞. Foliorum Conii recentium. Adipis Suillæ præparatæ, sing. ℥iv. The hemlock is to be bruised in a marble mortar, after which the lard is to be added, and the two ingredients thoroughly incorporated by beating. They are then to be gently melted over the fire, and after being strained through a cloth, and the fibrous part of the hemlock well pressed, the ointment is to be stirred till quite cold. To cancerous or scrofulous sores, this ointment may be applied with a prospect of advantage. (*Pharm. Chirurg.*)

The Pharmacopœia of St. Bartholomew's Hospital directs the unguentum conii, vel cicutæ, to be made as follows:—℞. Foliorum Cicutæ ℔j. Adipis Suillæ ℔iss. Boil the leaves in the melted hog's-lard until they become crisp. Then strain the ointment. A similar ointment might be more conveniently made, by mixing the extractum conii with any common salve.

UNGUENTUM DIGITALIS.—℞. Foliorum Digitalis Purpureæ recentium. Adipis Suillæ præparatæ, sing. ℥iv. This ointment may be made in the same manner as the unguentum conii, and tried in the same cases.

UNGUENTUM ELEMI COMPOSITUM.—℞. Elemi ℔j. Terebinthinæ ℥x. Sevi Ovilli præparati ℔ij. Olei Olivæ ℥ij. Melt the elemi with the suet; remove them from the fire, and mix them immediately with the turpentine and oil. Then strain the mixture.—Sometimes employed for dressing ulcers, which stand in need of stimulating applications.

UNGUENTUM GALLÆ CAMPHORATUM.—℞. Gallarum Pulveris Subtilissimi ʒij. Camphoræ ʒss. Adipis Suillæ præparatæ ℥ij. Misce.—This is a very good application to piles, after their inflammatory state has been diminished by the liq. plumbi. acet. dilut. and leeches.

UNGUENTUM HELLEBORI ALBI.—℞. Hellebori Albi pulv. ℥j. Adipis Suillæ præparatæ ℥iv. Olei Limonis ℈ss. Misce.—This ointment will cure the itch, and several other cutaneous diseases. Tinea capitis will sometimes yield to it.

*UNGUENTUM HYDRARGYRI FORTIUS.—℞. Hydrargyri purificati ℔ij. Adipis Suillæ præparatæ ℥xxiij. Sevi Ovilli præparati ℥j. First rub the quicksilver with the suet, and a little of the hog's-lard, until the globules disappear; then add the remainder of the lard, and make an ointment.—This is the common strong mercurial ointment. Of its uses we need say nothing in this place.

UNGUENTUM HYDRARGYRI CAMPHORATUM.—℞. Unguenti Hydrargyri ℥j. Camphoræ ʒss. Misce.—This is often recommended to be rubbed on thickened, indurated parts, with the view of exciting the action of the absorbents. Rubbed along the course of the urethra, it is very serviceable in diminishing and removing chordee.

UNGUENTUM HYDRARGYRI MITIUS.—℞. Unguenti Hydrargyri fort. ℔j. Adipis Suillæ præparatæ ℔ij. Misce.—The weaker mercurial ointment is often rubbed on indurated, thickened parts and tumours, when the object is merely to promote their absorption; and it is not adviseable to employ the unguentum hydrargyri fort. lest a salivation should be induced.

UNGUENTUM HYDRARGYRI NITRATIS.—℞. Hydrarg. Purificati ℥j. Acidi Nitrosi ℥ij. Adipis præparatæ ℥vj. Olei Olivæ ℥iv. Dissolve the quicksilver in the nitrous acid; and whilst the solution is yet hot, mix with it the oil and hog's lard, previously melted, but beginning to concrete, by being exposed to the air. This ointment is a celebrated application to the inside of the eyelids, in cases of chronic ophthalmy, and also to specks on the cornea. When blended with a little olive oil, it also forms a very eligible stimulating dressing for numerous kinds of sores. It is particularly efficacious in curing tinea capitis, and many other cutaneous diseases.

UNGUENTUM HYDRARGYRI NITRICO-OXYDI.—℞. Hydrargyri nitrico-oxydi ℥j. Ceræ Albæ ℥ij. Adipis præpar. ℥vj. Misce.—This is a common stimulating application to indolent ulcers, and sores in general.

UNGUENTUM HYDRARGYRI PRÆCIPITATI ALBI.—℞. Hydrarg. Præcip. Albi ʒj. Adipis præparatæ ℥iss. Misce.—An useful application in certain cases of porrigo, and some other cutaneous diseases. See *Porrigo.*

UNGUENTUM LIQ. PLUMBI ACETATIS.—℞. Liquoris Plumbi Acetatis ℥v. Adipis Suillæ ℔j. Ceræ Albæ ℥iv. Melt the ingredients together, and continue to stir them till cold.—This ointment is employed with great advantage as a simple dressing. According to Mr. Dunn, of Scarborough, it is much improved by pouring the liquified mixture, before the lead has been added to it, into cold water. It is then to be rubbed in a mortar, or on a slab with the liq. plumbi acet. The water occasions a fine white cloudy precipitation, which gives to the composition a better appearance.

UNGUENTUM OPHTHALMICUM.—℞. Adipis Suillæ præparatæ ℥ss. Tutiæ præparatæ, Bol. Armen. sing. ʒij. Præcip. Hydrarg. Albi ʒj. Misce.—Janin's celebrated ophthalmic ointment, frequently mentioned in the parts of this work, which relate to diseases of the eye and eyelids.

UNGUENTUM OXYGENATUM, vel ACIDI NITROSI.—℞. Axungiæ Suillæ recentis; non salsæ uncias sedecim. Leni calore in vase vitreo lente liquefactis aut continua agitatione instillentur, Acidi Nitrici unciæ duæ. Massa igni exponatur, donec ebullire cœpit; tunc ab igne removeatur, frigefactaque servetur.

In this process the nitric acid is decomposed, the nitrous gas escaping, and the oxygen combining with the lard. This ointment was particularly recommended by Alyon, as an application to venereal and herpetic ulcers. Its virtues are said to vary considerably, according to the strength of the acid employed, and it is not generally deemed so efficacious as the ointment of nitrate of mercury.

UNGUENTUM PICIS.—℞. Picis, Sevi Ovilli præparati, sing. ℔ss. Melt, and then strain them.

UNGUENTUM PICIS COMPOSITUM.—℞. Unguenti Picis, Unguenti Plumbi Superacetatis sing. ℔ss. Misce.

The two preceding ointments are applicable to cases of tinea capitis, and some eruptive complaints. Also to some kinds of irritable ulcers.

UNGUENTUM PICIS CUM SULPHURE.—℞. Unguenti Picis, Unguenti Sulphuris, sing. ℥iv. Misce.—This is one of the most common, and, I believe, the most efficacious applications for curing tinea capitis, or porrigo.

UNGUENTUM PLUMBI SUPERACETATIS.—℞. Plumbi Superacetatis ʒij. Ceræ Albæ ℥ij. Olei ℔ss. The superacetate of lead, previously powdered, is to be triturated with part of the olive oil. The melted wax and rest of the oil are then to be added. This is a good dressing for cases requiring a mild astringent application.

UNGUENTUM RESINÆ.—℞. Resinæ Flavæ, Ceræ Flavæ sing. ℔j. Olei Olivæ ℔j. Melt the resin and wax with a slow fire; then add the oil, and strain the mixture while hot.—This is a common application to ulcers, which stand in need of being gently stimulated.

UNGUENTUM SAMBUCI.—℞. Florum Sambuci, Adipis Suillæ, singulorum ℔j. The hog's lard being melted, boil the elder flowers in it till they become crisp, then strain the mixture.

UNGUENTUM SULPHURIS.—℞. Ad-

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*The preparation of this article will be greatly expedited by rubbing the mercury in the first instance, with a small proportion of the article familiar to us by the appellation of goose-grease; this can be done in a glass mortar, or even upon a marble slab, by a spatula; it has such immediate effect upon the mercury. One ounce of this article will be sufficient, with trituration for the space of one minute, to make the globules of the quicksilver entirely disappear, and render it at once fit for admixture with the proper proportion of lard.—*Am. Ed.*

pis Suillæ ℔ss. Florum Sulphuris ℥iv. Misce.

UNGUENTUM TUTIÆ.—℞. Tutiæ præparatæ, Unguenti Cetacei q. s. Misce.—Used for smearing the borders and inside of the eyelids, in cases of chronic ophthalmy, &c.

UNGUENTUM TUTIÆ COMPOSITUM.—℞. Tutiæ præparatæ, Lapidis Calaminaris præparati, sing. ʒvj. Camphoræ ʒij. Unguenti Sambuci ℔j. Misce.

This formula is contained in the Pharmacopœia of St. Bartholomew's Hospital. It is occasionally applied to the inside of the eyelids, piles, ulcerations, excoriations, &c.

UNGUENTUM ZINCI.—℞. Zinci oxydi ʒj. Adipis præpar. ℥vj. Misce.—An astringent application in very common use.

UNGUIS. (*A Nail.*) Some surgical authors apply this term to a collection of pus, or matter in the eye, when the abscess appears, through the cornea, to be shaped like a finger nail.

UNION BY THE FIRST INTENTION.—When the opposite surfaces of a wound are brought into contact, and grow together at once, without suppurating, union by the first intention is said to take place. When wounds heal by suppurating, granulating, &c. they are sometimes surgically described as getting well by the second intention. See *Wounds.*

URETHRA, DESTRUCTION OF PART OF THE.—The attempts to complete the canal by operations, performed on the Taliacotian principles, will be noticed in the article URINARY FISTULA.

URETHRA, STRICTURES OF.—A stricture of the urethra, as a modern writer observes, "consists of some morbid alteration of action, or of structure, by which a part of the canal is rendered narrower than the rest." (*Wilson on the Male Urinary and Genital Organs, p.* 361.) According to Mr. John Hunter, most obstructions to the passage of the urine, if not all, are attended with nearly the same symptoms. Few persons take notice of the first symptoms of a stricture, till they have either become violent, or other inconveniences have been the consequence. A patient may have a considerable stricture, yet be unconscious that his urine does not freely come away; and in consequence of a stricture, there may even be a tendency to inflammation and suppuration in the perinæum, while he feels no obstruction to the passage of his urine, and does not suspect that he has any other complaint.

There are three kinds of strictures; viz. the true permanent one, which arises from an alteration in the structure of a part of the urethra; the mixed case, consisting of a permanent stricture and a spasm; and, thirdly, the true spasmodic stricture.

Whether the urethra is a truly muscular canal, and whether a variety of circumstances, remarkable in its healthy and diseased state, can be accounted for by its elasticity, the action of the muscles in the perinæum, and other principles, without supposing the canal to be itself muscular, are questions on which the writers on surgery entertain different opinions. However, the generality of modern practitioners in this country have inclined to that view of the subject, which refers the property of muscularity either to the membrane of the urethra itself, or to the substance immediately surrounding it. The latter is now alleged to be the real case. "From Mr. Bauer's examinations (says Sir Everard Home) we find that the human urethra is made up of two parts, an internal membrane, and an external muscular covering. The internal membrane is exceedingly thin, and no fibres are met with that can give it a power of contraction. When it is put on the stretch in a transverse direction, the circumference of the canal is no ways increased; but when stretched longitudinally a small degree of elongation is produced. When a transverse section of the urethra is made, while in a collapsed state, the internal membrane is found thrown into folds, pressed together by the surrounding parts." It is afterward explained, that "the muscular covering, by which the membrane is surrounded or enclosed, is made up of fasciculi of very short fibres, which appear to be interwoven together, and to be connected by their origins and insertions with one another. *They all have a longitudinal direction.* There is a greater thickness of this muscular structure upon the upper, than the under surface of the urethra, which is still more evident as it approaches nearer to the external orifice. The fasciculi are united together by an elastic substance of the consistence of mucus. Immediately beyond the muscular portion of the urethra, is the cellular structure of the corpus spongiosum.

Formerly "it was believed, that either the lining of the urethra was composed of *circular* fibres, possessed of a power of contraction, or that it was immediately surrounded by such fibres; and therefore that the disease, commonly known by the name of a stricture in the urethra, was produced by a contraction of some of these *circular* fibres; and the permanent stricture was a term applied to these parts, when in consequence of inflammation they became confined to that particular state. We now find, that *the lining of the urethra is never met with in a contracted state*, but is thrown into folds by the action of the elastic ligamentous covering of the corpus spongiosum, and the swell of the *longitudinal* muscular fibres within it; and when these fibres have, by acting through their whole length, reduced the urethra to its shortest state, the pressure upon the internal membrane is so great, that there is not room for the urine to pass, till these fibres are relaxed by elongating the whole canal.

"A *spasmodic stricture* is in reality *a contraction of a small portion of the longitudinal muscular fibres*, while the rest are relaxed; and as this may take place either all round, or upon any one side, it explains what is met with in practice, and could not before be satisfactorily accounted for; the mark, or impression of a stricture sometimes forming a circular depression upon the bougie; at other times, only on one side.

"*A permanent stricture is that contraction of the canal, which takes place in consequence of coagulable lymph being exuded between the fasciculi of muscular fibres, and upon the internal membrane*, in different quantities, according to circumstances; and, in the same proportion, diminishing the passage for the urine at that part, or completely closing it up." (*Sir Everard Home in Phil. Trans.* 1820, *and Pract. Obs. on Strictures, Vol.* 3, *p.* 26, *&c. 8vo. Lond.* 1821.)

For a particular detail of the arguments and remarks, urged against the doctrine of the urethra being a tube, capable of having its diameter suddenly lessened at every point by the contraction of muscular fibres, I must refer to the writings of Mr. C. Bell and Mr. Shaw, whose statements, indeed, have been noticed in my introductory work. (See *First Lines of the Practice of Surgery*, *ed.* 4, *Vol.* 2.)

In all obstructions of the urethra, Mr. Hunter remarks, that the stream of water becomes small in proportion to the stoppage; but, though this symptom is probably the first, it is not always observed by the patient. In some instances, the water is voided only by drops, and then it cannot escape notice. In other cases, the stream of urine is forked, or scattered. Under such circumstances, Mr. Hunter recommends the passage to be examined with a bougie; and, if one of a common size can be readily introduced, the difficulty of voiding the urine is likely to depend on a diseased enlargement of the prostate gland, which should, therefore, be examined. See *Prostate Gland.*

The spasmodic stricture may be known by its being only of temporary duration. This kind of case, and more particularly the permanent stricture, are generally attended with a gleet. The latter complaint is often for a long while suspected as being the only one, and the surgeon finds all his efforts, to effect a cure, fruitless.

In diseases of the urethra, and also of the prostate gland and bladder, there is commonly an uneasiness about the perinæum, anus, and lower part of the abdomen. (*Hunter.*)

The first progress of the contraction is, in general, very slow; but, when once it has so far increased, that the longitudinal fibres are not wholly relaxed by the force of the urine, its subsequent advances are more rapid, and new symptoms are perceived. The urine is voided more frequently, does not pass without a considerable effort, attended with pain and a straining sensation continues, after the bladder is emptied. If the patient accidentally catches cold, drinks a glass of spirituous liquor, acid beverage, or punch, commits an excess in drinking wine, or removes quickly from a warm to a cold temperature, the urine will, perhaps, pass only in drops, or be entirely obstructed. These causes induce, in the longitudinal fibres at the contracted part, a spasmodic action, by which it is closed. Cold, externally applied to the body, has so great an effect upon a spasmodic stricture, that a patient, who can make water without the smallest difficulty in a warm room, is often quite unable to void a drop, on making the attempt in the open air. However, on returning to a warm room, and sitting down a little while, he becomes able again to expel his urine. The symptoms of a stricture are more frequent in persons who lead a sedentary life, than in those whose pursuits are active.

Strictures in the urethra, being attended with a discharge and pain in making water, especially after any excess, are frequently regarded and treated as a gonorrhœa. These two symptoms often come on a few hours after connexion with women; the degree of inflammation is very slight; the discharge is the first symptom, and is more violent at the commencement, than at any other period. The inflammation subsides in a few days, leaving only the discharge, which also frequently disappears in five or six days, whether any means are employed or not for its removal. (*Home.*)

What renders a stricture particularly apt to be mistaken for a gonorrhœa, is the circumstance that, in both diseases, the pain in making water is experienced about an inch and a half from the orifice of the glans penis.

In a more advanced stage, the part of the urethra which is the seat of stricture, is always much narrower than the rest of the canal. The stricture is permanent, being combined with a thickening of structure, whereby the diameter of the diseased part of the passage is lessened. However, the diameter of the affected portion of the canal even now varies, according as the spasm and projection of the longitudinal fibres, the spasmodic action of the muscles about the perinæum, and the effects of inflammation, contribute more or less to a temporary increase of the obstruction. In the language of Sir Everard Home, the case is now both a permanent stricture, and a spasmodic one; permanent, because the diseased part of the urethra is always narrower than the rest of this passage; and spasmodic, inasmuch as the stricture may be rendered still more contracted by spasm affecting the muscular structure, adjoining the disease. In the contracted state the passage is closed up; in the relaxed, the urine can pass through it in a small stream.

The spasmodic contraction must act with considerable force, since the urine cannot even pass in a small stream, and a small bougie, which, in a relaxed state of the urethra, met with no resistance, can now be scarcely introduced at all. Also, if the bougie be allowed to remain for a few minutes in the stricture, it is not unfrequently grasped so tightly by the spasmodic contraction, that, when an attempt is made to withdraw it, some force is requisite to succeed. The bougie, when examined, seems as if it had had an impression made round it by a piece of packthread. (*Home.*)

In old cases of stricture, the muscular coat of the bladder becomes thickened and stronger than natural, in consequence of more force being necessary to propel the urine through the obstructed part. The bladder, in this thickened state, does not admit of the usual dilatation, so that the patient is obliged to make water very frequently, and he is unable to pass the whole night without making this evacuation once or twice. (*Home.*)

A nocturnal emission of the semen is another very common symptom of a stricture; and some patients seem to have no other complaint attendant on the disease of the urethra.

A periodical discharge is sometimes brought on by cold, or other occasional causes. When the inflammation extends to the bladder, the frequency of making water is considerably increased, and the urine very turbid. It is voided for twelve, or twenty-four hours, once or even twice every hour; and, when allowed to stand, it deposits a substance in the form of powder, consisting of coagulable lymph. This is the slightest kind of attack.

Sometimes the bladder is inflamed in a greater degree, and secretes pus, which is discharged with the urine. In a still more violent attack, the discharge is similar to the white of an egg, and particularly adhesive. Sir Everard Home states, that it has been discovered by examinations after death, to be the vitiated secretion of the prostate gland. When the inflammation of the bladder becomes still worse, the affection sometimes extends to the peritoneum, and the patient dies.

As strictures of long standing always impede the passage of the urine, the bladder acts with augmented force to overcome the resistance. In this manner, the stricture is kept in a continual state of irritation, and the obstruction becomes more and more considerable.

In a few cases, indeed, the diseased part of the urethra is rendered quite impervious; and the patient's life is preserved by the urethra ulcerating, at some point within the obstruction, and fistulous openings taking place in the perinæum. See *Fistulæ in Perinæo.*

Strictures are frequently attended with constitutional symptoms, one of the most common of which, in warm climates, is a complete paroxysm of fever. The cold fit is very severe; this is followed by a hot fit, and then a very profuse perspiration. During the rigour, nausea and vomiting generally occur, and at this period the patient has occasion to make water frequently, seldom experiencing at the same time any strangury. When the fit is tolerably complete, the patient suffers, in general, only one; in the opposite circumstance, two; but a greater number rarely happen. Such febrile paroxysms are not frequent in cold countries; but do every now and then take place, particularly in consequence of exposure to cold, excesses, and the introduction both of common and armed bougies.

According to the principles of Sir Everard Home, the longitudinal muscular fibres on the outside of the membrane of the urethra, are liable to a spasmodic contraction, in which state their swell lessens the diameter of the passage, and they are incapable of becoming relaxed again, until the spasm is removed. This spasmodic stricture is only a wrong action of these longitudinal fibres; and, if the parts could be examined in their relaxed state, there would be no appearance of disease.

When the contraction is not considerable, it appears, on examination after death, to be merely a narrowing of the urethra; but a permanent stricture, in a more advanced state, usually consists of a ridge, which forms a projection in the passage. (*Home.*)

Mr. Hunter informs us, that the disease generally occupies no great length of the passage; at least, that this was the case in most of the instances which he examined. In these cases, the contraction was not broader, than if it had been produced by surrounding the urethra with a piece of packthread; and in many it had a good deal of the appearance, which one may fancy such a cause would produce. Mr. Hunter states, however, that he had seen the urethra contracted for above an inch in length, owing to its coats, or internal membrane being irregularly thickened, and forming a winding canal.

A stricture does not always arise from an equal contraction of the urethra all round; for, in some instances, the contraction is only on one side; a fact, which appears to me to be better accounted for by the consideration of the longitudinal arrangement of the muscular fibres in packets, on the outside of the membrane of the urethra, than the circular kind of stricture, only occupying as small an extent of the passage, as the constriction which would arise from the application of a piece of packthread round it. The contraction of one side of the canal only throws the passage to the opposite side, which often renders the introduction of a bougie difficult. The contracted part is whiter than the rest of the urethra, and is harder in its consistence. In some cases there are several strictures. Mr. Hunter mentions his having seen half a dozen in one urethra, and he observes, that a stricture is frequently attended with small tightnesses in other parts of the passage.

Mr. Hunter remarks, that every part of the urethra is not equally subject to strictures, the bulbous portion being much the most subject to the disease. A stricture is sometimes situated on this side of the bulb, but very seldom beyond it, that is, nearer the bladder. Mr. Hunter never saw a stricture in that part of the urethra, which passes through the prostate gland; and the bulb, besides being the most frequent seat of this disease, is also subject to it in its worst forms. (*Hunter.*)

Sir Everard Home has measured the length of the urethra in different subjects, and examined the diameters of the several parts of the passage. Strictures, according to this gentleman, occur most commonly just behind the bulb of the urethra, the distance from the external orifice being 6 1-2 or 7 inches. The situation, next in the order of frequency, is about 4 1-2 inches from the orifice of the glans. The disease does also occur at 3 1-2 inches, and sometimes almost close to the external orifice. The two parts of the urethra, most frequently affected with strictures, are naturally the narrowest. Sometimes the very orifice of the urethra is contracted, and the circumstance often leads to an erroneous supposition, that the whole canal is naturally formed of the same size. The prepuce also is observed to be particularly often affected with a natural phymosis, in persons who have strictures in the urethra.

In almost all the cases which Sir E. Home has met with, there has been one stricture, about seven inches from the external orifice, whether there were any others, or not.

With respect to the causes of strictures, some writers have imputed the disorder to the effects of the venereal disease, and often to the method of cure. Mr. Hunter entertained strong doubts however, whether strictures commonly, or ever proceeded from these causes; though he acknowledges, that since most men have had venereal complaints, a refutation of the above opinion is very difficult. Mr. Hunter was led to think, that strictures did not commonly arise from venereal causes, from reflecting that strictures are common to most passages in the human body. They often take place in the œsophagus; the intestines, particularly the rectum; the anus; the prepuce so as to produce phymosis; and in the lachrymal duct, so as to occasion a fistula lachrymalis. Strictures sometimes take place, when there have been no previous venereal complaints. Mr. Hunter mentions his having seen an instance of this kind in a young man, nineteen years of age, who had had the complaint for eight years, and which therefore began, when he was only eleven years old. He was of a weak scrofulous habit. Mr. Hunter had also seen a stricture in a boy only four years old, and a fistula in perinæo in consequence of it. Strictures happen as frequently in persons, who have had gonorrhœa in a slight degree, as in others, who have had it in a severe form.

It is not an uncommon belief, that strictures arise from the use of astringent injections in the treatment of the gonorrhœa. Sir Everard Home is of this sentiment, and so is Mr. Wilson. (*On the Male Genital and Urinary Organs, p.* 370.) The latter gentleman however, mentions some circumstances, calculated to raise doubts on this point, especially the fact, that while injections rarely enter far into the urethra, the most common seat of a stricture is where the membranous part of the canal joins the bulb. Mr. Hunter himself deemed the opinion founded on prejudice, and states that he had seen as many strictures after gonorrhœa, which had been cured without injections, as after cases which had been treated with these latter applications.

He rejected also the old doctrine, that strictures are a consequence of ulcers in the urethra; for ulcers hardly ever occur in this passage, except when there are strictures; and it is now generally admitted, that in gonorrhœa, there are no sores in the urethra. Strictures are sometimes produced by external violence, though the passage would appear to be capable of frequently bearing considerable wounds and other injuries, without this consequence. Thus strictures are not common from lithotomy, and in a modern work, we read the case of a serious gunshot wound of the urethra, where no stricture ensued. (See *Annuaire Med. Chir. des Hôpitaux de Paris*, 4*to.* 1819.)

TREATMENT OF STRICTURES, WITH COMMON BOUGIES, ON THE PRINCIPLE OF DILATATION.

Mr. Hunter remarks, that the cure of strictures may be accomplished, either by a dilatation of the contracted part, or a destruction of it by ulceration, or escharotics. To these methods are to be added, first the plan of forcing a passage through the stricture with a conical sound, as practised by the French surgeons, when they cannot otherwise pass the stricture, and the symptoms are urgent. (See *J. Cross, Sketches of the Medical Schools of Paris*, 8*vo. Lond.* 1815, *p.* 111; *and First Lines of the Practice of Surgery, Vol.* 2, *ed.* 4;) and secondly, the method of cutting down to obliterated portions of the urethra, and attempting to cure the obstruction by the removal of the diseased parts, tracing the continuation of the passage, and trying to heal the wound over a catheter. Both these practices are attended with such difficulties and dangers, as should make every prudent surgeon very reluctant to adopt them, except under very urgent circumstances, in which every milder method fails. The dilatation is accomplished by means of bougies or catheters; but Mr. Hunter considered, that a cure thus effected was seldom or never more than temporary. The removal of the stricture by ulceration, may also be effected with bougies. Its destruction with caustic used formerly to be executed through a cannula, contrived for the purpose; but is now performed by means of *caustic*, or *armed bougies.*

The cure by dilatation is principally mechanical, when effected by bougies, the powers of which are generally those of a wedge. However, Mr. Hunter conceived, that their ultimate effect was not always so simple as that of a wedge upon inanimate matter: for pressure makes living parts either adapt themselves to their new position, or else recede by ulceration. Bougies of course, either dilate strictures, or make them ulcerate.

The disease has generally made considerable progress, before surgical assistance is required, and the stricture may be so advanced, that a small bougie cannot be made to pass, without a great deal of trouble. If the end of a small bougie, let it be ever so small, can be introduced through the stricture, *the cure is then in our power.* However, a small bougie frequently cannot pass in the first instance, and even not after repeated trials.

Often when the stricture is very considerable, a great deal of trouble is given by occasional spasms, which either resist the introduction of a bougie altogether, or only allow a very small one to pass. At other periods, however, a larger one may be introduced. In these circumstances Mr. Hunter mentions, that he was sometimes able to make the point of the bougie enter, by rubbing the outside of the perinæum with the finger of one hand, while he pushed the bougie on with the other. The same eminent practitioner often succeeded by letting the bougie remain a little while close to the stricture, and then pushing it on. Sometimes the spasm may also be taken off by dipping the glans penis in cold water.

Although in cases of permanent strictures, the bougie may not pass at first, yet after repeated trials, it will every now and then find its way. In this manner future attempts become more certain and easy.

However, the success of the subsequent trials to introduce a bougie does not always depend on the instrument having been once or twice passed. Sometimes it can be introduced to-day, but not to-morrow; and in this state, the case may continue for weeks, notwithstanding every trial which can be made. Mr. Hunter observes however, that in general, the introduction of the bougie becomes gradually less difficult, and therefore, that we ought not to despair of success in any case.

When the passage is very small, it is not easy to know whether the bougie has entered the stricture or not; for bougies as slender as those which must be at first employed, bend so very easily, that the surgeon is apt to fancy, that they are passing along the urethra, while they are only bending. Mr. Hunter advises the surgeon first to make himself acquainted with the situation of the stricture, by means of a common-sized bougie; and then to take a smaller one, and when its point arrives at the stricture, the instrument is to be gently pushed forward, but only for a short time. If the bougie has passed further into the penis, the surgeon may know how far it has entered the stricture, by taking the pressure off the bougie. For, *if it recoil*, he may be sure that *it has not passed;* at least, has not passed far, but only bent. On the contrary, *if it remain fixed, and do not recoil, it has certainly entered the stricture.*

However, the preceding remarks are said not to be so applicable when a very small bougie is employed, which may become bent, without our being aware of the circumstance.

A bougie may frequently be introduced a very little way, for instance, only one-tenth of an inch, and then it bends, and cannot be pushed further. To determine whether this is the case, Mr. Hunter says, it is necessary to withdraw the bougie and examine its end. If the end be blunted, we may be sure, that the bougie has not entered at all; but if it be flattened, for an eighth, or tenth of an inch, be grooved, or have its outer waxen coat pushed up to that extent; or if there be a circular impression made upon the bougie, or only a dent on one side, made by the stricture; we may be sure that the instrument has passed as far as these appearances extend. It then becomes necessary to introduce another of exactly the same size, and in the same manner, and to let it remain as long as the patient can bear it, or convenience will allow. By repetitions of this plan, the stricture will be overcome.

Mr. Hunter remarks, that the time which each bougie ought to remain in the passage must be determined by the feelings of the patient; for if possible, no pain should ever be given. If the patient should experience very acute pain when the bougie is passing, it ought not to be left in the urethra above five, or at most, ten minutes; or not so long if the pain be exceedingly severe. Each time of application should afterward be lengthened so gradually as to be imperceptible to the feelings of the patient, and the irritability of the parts. Mr. Hunter affirms, that he has known many patients, who could not bear a bougie to remain in the passage ten, or even five minutes, till after several days, and even weeks, but who in time were able to wear the instrument for hours, and this, at last without any difficulty. The best time for keeping a bougie in the urethra, is when the patient has least to do; or in the morning, while he is in bed, if he can introduce the instrument himself.

Mr. Hunter next observes, that the bougie should be increased in size, according to the facility with which the stricture becomes dilated, and the case with which the patient bears the dilatation. If the parts are very firm, or very irritable, the increase of the size of the bougie should be very slow, so as to allow them to become gradually adapted to the augmented size of the instrument. But if the sensibility of the parts will allow, the increase of the size of the bougie may be somewhat quicker, but never more sudden than the patient can easily bear. The surgeon must continue to increase the size of the bougie, till one of the largest size can freely pass; nor should the use of this be discontinued till after three weeks, or a month, in order that the dilated part may have time to become habituated to its new position, and lose its disposition to contract again. However, Mr. Hunter believed, that the permanency of a cure, effected on the principle of dilatation, could seldom be depended upon.

At the present day, many surgeons prefer bougies composed of metal, flexible enough to allow their curvature to be adapted to the bend of the urethra, yet sufficiently firm to retain the figure given them, while they are employed. Others very commonly use iron sounds, which, in cases where it is necessary to have an instrument possessing more firmness than a wax bougie, and having a point more unchangeably turned upwards than that of the latter instrument, may have advantages. But, for all ordinary cases, I consider a common bougie a safer and better instrument; one with which the surgeon is less apt to exert unwarrantable force, so as to occasion a dangerous degree of irritation, or, what is worse, a false passage.

CURE OF STRICTURES BY ULCERATION.

This is also accomplished by means of a wax or metallic bougie, and the plan may be tried both when the instrument can, or cannot be introduced through the stricture. In the first instance, the method is less proper, because the stricture admits of being dilated.

In order to cure a stricture by making it ulcerate, the bougie is to be introduced as far through the contracted part as possible, and the size of the instrument is to be augmented, as fast as the sensations of the patient can well bear. In this manner ulceration will be produced in the part which is pressed; and Mr. Hunter remarks, that the cure will be more lasting, because more of the stricture is destroyed than when the parts are simply dilated. This eminent surgeon notices, however, that few patients will submit to this practice, and that few indeed would be able to bear it, since it is apt to bring on violent spasms in the part, attended with a very troublesome retention of urine.

If the smallest bougie cannot be made to pass a stricture, by using some degree of force, dilatation becomes impracticable; and as the stricture must be destroyed, something else must be tried. In many cases, says Mr. Hunter, it may be proper to get rid of the stricture, by making it ulcerate, or, in other words, be absorbed. Bougies, intended to excite ulceration, need not be so small as in the foregoing cases, as they are not designed to be passed through the stricture; and, in consequence of being of the common size, they may be more surely applied to the parts causing the obstruction. The force applied to a bougie, in this case, should not be great: for a stricture is the hardest part of the urethra; and if a bougie is forcibly pushed on, its end may slip off the stricture, before ulceration has commenced, and make a false passage for itself in the corpus spongiosum urethræ.

In trying to cure strictures by ulceration, the utmost attention must be paid; and if the patient does not make water better, notwithstanding the bougie passes further, the surgeon may be sure he is forcing a false passage.

When the stricture has so far yielded, as to allow a small bougie to be introduced, the treatment is then to be conducted on the principle of dilatation.

Mr. Hunter observes, that whenever a bougie of a tolerable size passes with ease, and the parts and the patient have become accustomed to it, the surgeon need no longer attend for the purpose of introducing it. The patient may now be allowed to introduce bougies himself; and when he can do this with ease, the business may be trusted to him, as he can make use of the instruments at the most convenient times, so that they may be more frequently and longer applied. In the mean while, the surgeon should only pay occasional visits. Mr. Hunter adds, that this practice of the patient, under the surgeon's eye, by which means the former learns the art of introducing bougies, is the more necessary, since strictures are diseases which commonly recur; and, therefore, no man who has ever had a stricture, and is cured of it, should rely on the cure as lasting; but should always be prepared for a return, and always have some bougies by him. He should not go a journey, even of a week, without them; and the number should be according to the time which he is absent, and the place to which he is going; for in many parts of the world he cannot be supplied with them.

To prevent the inconvenience of a bougie slipping out, or the mischief of its gliding into the urethra, a soft cotton thread must be tied round that end of the bougie which is out of the urethra, and then round the root of the glans. This last part of the thread should be very loose. The projecting portion of the bougie should also be bent down upon the penis, by which means it is rendered less troublesome, and more secure. (See *Hunter on the Venereal Disease.* When a considerable part of the bougie remains out of the urethra, surgeons usually clip a piece of it off.

In many examples, in which a stricture is accompanied with excessive irritability in the urethra, much pain, and a tendency to frequent retentions of urine, when a common bougie is employed, it becomes adviseable to alter the plan of treatment, and use either flexible metallic, or elastic gum bougies. (See *Bougie.*) Desault commonly cured all strictures by the skilful employment of flexible gum catheters, which his patients were directed to wear a certain length of time every day. These last instruments produce less pain and irritation than any kind of bougie, more especially when the wires are withdrawn; and were I to be myself afflicted with strictures, I should feel strongly disposed to attempt their removal by the use of elastic gum catheters, which are unquestionably the mildest and least painful means of cure. I have seen cases, however, in which the flexible metallic bougie seemed to cause much less irritation than any other kind of bougie; but in general, those made of elastic gum give the least pain. Metallic bougies possess the advantage of retaining the exact curvature of the passage better than others; and, as I have observed, they enable the surgeon to employ more force, and this with more precision than can be done with a wax bougie. Yet, as force is not a principle to be much commended in the treatment of ordinary strictures, I doubt whether such instruments will long retain as many employers as they have now acquired, and many of whom use them indiscriminately in all cases. Small catgut bougies are chiefly eligible, when the cure by dilatation is preferred, and the smallest bougies of other descriptions cannot be introduced through the stricture.

CURE OF STRICTURES WITH THE ARGENTUM NITRATUM.

Wiseman makes mention of the plan of curing strictures in the urethra by means of caustic. He observes, that when the obstruction is a caruncle, and you cannot pass it, you may well conclude it is callous: "in which case, you may pass a cannula into the urethra to that caruncle, and, whilst you hold it there steady, you may convey a grain of caustic into the cannula, and press the caustic to it; and whilst you hold it there, you will perceive its operation, by the pressing forward of the cannula."

About the year 1752, Mr. Hunter attended a chimney-sweeper, who had a stricture. Not finding that any benefit was derived from the use of common bougies, for a space of six months, Mr. Hunter, unaware of the above passage in Wiseman, conceived, that the stricture might be destroyed by escharotics, and the first attempt, which he made, was with red precipitate. He put some salve on the end of a bougie, and then dipped it in red precipitate. The bougie in this state, was passed down to the stricture; but Mr Hunter found, that it brought on considerable inflammation all along the inside of the passage, as he thought, in consequence of the precipitate being rubbed off, while the bougie was passing to the stricture. He then introduced a silver cannula down to the stricture, and again passed the bougie with precipitate through the tube. As the patient, however, did not make water any better, and the smallest bougie could not be introduced through the stricture, it was suspected, that the precipitate had sufficient power to destroy the obstruction. Mr. Hunter was induced, therefore, to fasten a small piece of the argentum nitratum on the end of a piece of wire with sealing-wax, and introduce the caustic through the cannula to the stricture. After having made the application three times, at intervals of two days, he found that the man voided his urine much more freely, and on applying the caustic a fourth time, the cannula went through the stricture. A bougie was introduced for a little while afterward, till the man had completely recovered.

Having experienced this success, Mr. Hunter was encouraged to apply his mind to the invention of some instrument, better suited to the purpose, than the above contrivance; and an improved instrument was devised, although he acknowledges, that it was not perfectly adapted to strictures in every situation in the urethra. He remarks that the caustic should be prevented from hurting the unaffected part of the urethra by introducing the active substance, through a cannula, down to the stricture; and that it should be capable of protruding a little beyond the end of the cannula, by which means it will only act upon the stricture. The caustic should be fixed in a small portcrayon, and it is necessary to have a piece of silver of the length of the cannula, with a ring at one end, and a button at the other, of the same diameter as the cannula. The button forms a kind of plug, which should project beyond the end of the cannula in the urethra, so as to make a rounded end; or, Mr. Hunter says, the portcrayon may be formed with this button at its other end. The cannula, with the button, is to be passed into the urethra, and when it reaches the stricture, the silver plug should be withdrawn, and the portcrayon with the caustic introduced in its place; or, if the plug and portcrayon are on the same instrument, then it is only necessary to withdraw the plug, and introduce the portcrayon with the caustic. The plug, besides giving a smooth rounded end to the cannula, answers another good purpose, by preventing the tube from being filled with the mucus of the urethra, when the instrument is passing inward, which mucus would be collected in the end of the cannula, dissolve the caustic too soon, and hinder its application to the stricture.

When the stricture was beyond the straight part of the urethra, Mr. Hunter owned, that it was difficult to apply caustic to the disease through a cannula.

A better mode of applying lunar caustic to strictures was afterward devised by Hunter, and has since been extensively introduced into practice by Sir E. Home. This gentleman directs us to take a bougie of a size that can be readily passed down to the stricture, and to insert a small piece of lunar caustic into the end of it, letting the caustic be even with the surface, but surrounded every where laterally by the substance of the bougie. This should be done some little time before it is required to be used; for the materials of which the bougie is composed, become warm and soft by being handled in inserting the caustic; and, therefore, the hold which the bougie has of the caustic, is rendered more secure after the wax has been allowed to cool and harden. The bougie thus prepared, is to be oiled and made ready for use; but before passing it, a common bougie of the same size is to be introduced down to the stricture, in order to clear the canal, and to measure the exact distance of the stricture from the orifice of the urethra. This distance being marked upon the armed bougie, it is to be passed down to the stricture, as soon as the other is withdrawn. The caustic, in its passage, is scarcely allowed to come into contact with any part of the membrane, because the point of the bougie, of which the argentum nitratum forms the central part, always moves in the middle line of the canal; and, indeed, the quickness with which it is conveyed to the stricture, prevents any injury of the membrane lining the passage when the caustic accidentally touches it.

In this mode the caustic is passed down with little or no irritation to the lining of the urethra; it is applied in the most advantageous manner to the stricture, and can be retained in that situation sufficiently long to produce the desired effect.

The reasons urged in favour of the employment of bougies armed with the lunar caustic, are, that a permanent cure is effected, which common bougies cannot accomplish; that the pain arising from the application of the argentum nitratum to the stricture, is very inconsiderable; and that neither irritation nor inflammation is found to ensue. The meaning of these remarks, however, is to be received as a general one, liable to exceptions. Indeed, Sir E. Home himself has candidly acknowledged, that some inconveniences occasionally follow the use of armed bougies. But what practice, however judicious and eligible, is altogether free from occasional ill consequences? Sir E. Home remarks, that against treating strictures of the urethra with caustic bougies, numerous objections have been adduced, and many bad consequences have been attributed to the practice, without any real foundation; "for whatever, *à priori*, might be supposed the effects of so violent an application, to a membrane so sensible and irritable as the urethra, and I will admit that it is very natural to conceive they would be very severe, the result of experience, the only thing to be relied on, evinces the contrary. The pain that is brought on, is by no means violent; and neither irritation nor inflammation is found to take place.

"That cases do occur, in which strictures have produced so much mischief, and rendered so great an extent of the canal diseased, that the use of the caustic has proved unsuccessful, is certainly true; and several of these cases have fallen within my own knowledge. But when it is stated that none, even of these, were made worse by its use; that no bad consequences attend it; and that no other mode, at present known, is equally efficacious; any occasional want of success cannot be considered as an objection to this mode of practice.

"But if the apprehension of violent effects from the caustic, however ill-founded, cannot be removed, let the alternative be considered; namely, the only operation previously in use, where a stricture cannot be dilated by the bougie.

"In those cases we are obliged to have recourse to means certainly more severe and violent, laying open with a knife the diseased urethra, and passing through the divided parts a flexible gum-catheter into the bladder. This I have done myself, and have frequently seen it performed by Mr. Hunter, and it always succeeded; neither bringing on so much inflammation as was expected, nor being attended with any symptoms of irritation.

"This practice has by other surgeons been carried still further; the portion of diseased urethra has been dissected out, and entirely removed; nor has so severe an operation always brought on untoward symptoms; and patients have recovered.

"If the membrane of the urethra, when diseased, is capable of suffering so much injury without any consequent symptoms of irritation, it cannot be doubted that it will bear with impunity to be touched, in a very partial manner, several different times with lunar caustic."

Sir Everard afterward proceeds: "Having met with a number of facts, from which a general principle appears to be established, that the irritable state of a stricture is kept up, and even increased, by the use of the bougie, but lessened and entirely destroyed by the application of lunar caustic; I am desirous to communicate my observations upon these facts, and to recommend the use of the caustic in many cases of irritable stricture, *in preference to the bougie*.

"As the use of the caustic upon this principle is, I believe, entirely new, and is contrary to every notion that has been formed upon the subject, it will require something more than general assertion to gain even the attention of many of my readers, still more their belief; I shall therefore detail the circumstances as they occurred, by which I conceive the propriety of this practice to be established; and afterward make some observations upon the principle on which it depends.

"My connexion in practice with Mr. Hunter afforded me opportunities of attending to cases of stricture in all their different stages; many of them brought on during a long residence in India, attended with great irritability, and exceedingly difficult of cure.

"One case of this kind admitted the passing of a small bougie; but, in the course of three years, very little was gained by a steady perseverance in the use of that instrument, either in dilating the canal, or palliating the symptoms of stricture; this made me look upon the bougie as less efficacious than I had always been taught to believe it. I was willing, however, to consider this as an uncommon case, depending more on the peculiarities of the patient's constitution than on the nature of the disease: but I found, on a particular inquiry, that several other gentlemen from India were under circumstances nearly similar; the bougie only preventing the increase of the stricture, but being unable to dilate it beyond a certain size; and when it was left off, the stricture in less than two months returned to its former state of contraction.

"What plan ought to be followed in such cases, I was then unable to determine; but, that the bougie could not be depended on was evident. During the suspense, the following case came under my care.

"In August, 1794, a gentleman consulted me for some symptoms which had been considered as indicating the presence of gonorrhœa; but, as they did not yield to the common treatment in the usual time, he was induced to take my advice respecting the nature of his complaint. In the necessary inquiry, to obtain a perfect history of the case, among other things it was stated, that, nineteen years before, there was a stricture which became very troublesome, and that Mr. Hunter, by the desire of the patient, had applied the caustic, by which the stricture was removed, and never afterward returned. He said that he was one of the first persons on whom the caustic had been used. From this account, I was naturally led to believe that the stricture had gradually returned, and was now increased, so much as to produce the present symptoms; a discharge being almost always a symptom of stricture when it is much contracted; but, upon examining the canal, a bougie of full size passed on to the bladder without the smallest impediment. I therefore took up the case as an inflammation in the urethra; and large doses of the balsam of copaiva, given internally, effected a cure.

"The circumstance of a stricture having been removed nineteen years before, and not returning, made a strong impression on my mind, and made me desirous to ascertain whether this practice could be employed in cases of stricture in general, and the cure produced by it equally permanent. A short time afterward, I had an opportunity of trying it in the following case.

"A captain in the East India Company's service, in September, 1794, applied to me for assistance. His complaints were, great irritation in the urethra and bladder, constant desire to make water, and an inability to void it, except in very small quantities. These symptoms had been at first supposed to arise from gonorrhœa, afterward rendered more severe by catching cold; but, not yielding to the usual remedies for gonorrhœa, they were investigated more minutely, and a stricture was discovered in the urethra. The mode of treatment was now changed, and the bougie employed; but its use aggravated all the symptoms, and brought on so great a degree of irritability in the bladder and urethra, that there was an alarm for the patient's life, which was the reason for applying for my assistance.

"Besides the local symptoms, this patient had those of quick pulse, white tongue, hot and dry skin, loss of appetite, and total want of sleep, with frequent attacks of spasm on the bladder and urethra. A very small flexible gum-catheter was passed, and the water drawn off, in quantity about a pint, which gave him great relief: this was repeated morning and evening, to keep the bladder in as easy a state as possible; but, in other respects, he continued much the same.

"As the present symptoms were brought on by the use of the bougie, little good was to be expected from that instrument; and where the urethra had been so easily irritated, and was disposed to continue in that state, there was no prospect of the use of the bougie afterward effecting a cure. These circumstances I explained to the patient; and mentioned, in proof of my opinion, the case in which so little had been effected in three years.

"I then proposed to him a trial of the caustic, with a view to deaden the edge of the stricture, as the only probable means of effecting a cure. The degree of irritation was already great; I was, however, led to believe that the application of the caustic was not likely to increase it; since, by destroying the irritable part, it might lessen and even remove the spasmodic affection; but if, contrary to my expectation, the irritation continued, we still should be able to draw off the water, as the slough formed by the caustic would prevent the edge of the stricture from acting and obstructing the instrument.

"The application of the caustic was, upon these grounds, determined on; and it was applied in the following manner.

"I passed a common bougie, nearly the size of the canal, down to the stricture, to ascertain its exact situation, and to make the canal of the urethra as open as possible. The distance was then marked upon a bougie armed with caustic, of the same size, which was conveyed down as quickly as the nature of the operation would admit. It was retained upon the stricture with a slight degree of pressure; at first there was no pain from the caustic, but a soreness from pressure; in less than a minute a change was felt in the sensation of the part, it was at first a heat, succeeded by the burning pain peculiar to caustic; as soon as this was distinctly felt, the bougie and caustic were withdrawn, having remained in the urethra about a minute altogether. The soreness, he said, was entirely local, by no means severe, was unaccompanied by irritation along the canal, and he thought the uneasiness in the bladder diminished by it. He described the pain as resembling very exactly the first symptoms of gonorrhœa. This sensation lasted half an hour after withdrawing the bougie.

"The caustic was applied about one o'clock in the forenoon, and he passed the day more free from irritation than he had since the beginning of the attack, which had lasted six days. In the evening, the water was drawn off with more ease than the night before. He passed a tolerable night, and, the next day, continued free from irritation. On the third day, the caustic was again applied in the forenoon; the painful sensation was less than on the former application, lasted a shorter time, and in an hour after the armed bougie was withdrawn, he made water freely for the first time since the commencement of his indisposition. He said the irritation in the bladder was removed, and he felt very well, his appetite returned, he slept very well, and continued to void his urine with ease.

"In this state, nothing was done till the fifth day, leaving always a day between the applications of the caustic.

"On this day a common-sized bougie went readily into the bladder; it was immediately withdrawn, and the cure was considered as complete; no bougie was afterward passed, lest it might bring back an irritation upon the passage. I met this gentleman twelve months afterward, and he assured me he had continued perfectly well, and I have since learned that, in three years, there has been no return.

"From the result of this case, I was encouraged to hope that the caustic might be applied to strictures in the urethra with more confidence than I had hitherto believed, since it evidently did not bring on or increase the general irritation, but, on the contrary, seemed to allay it."

The foregoing case, together with another which Sir E. Home has related, convinced this gentleman that he had discovered an effectual mode of treating such strictures as do not admit of being relieved by the common bougie. Hence he adopted the use of armed bougies as a general practice; but he has not concealed the circumstances under which the method does not prove successful. Sir Everard informs us, that "in some constitutions, where the patients have resided long in warm climates, every time the caustic is applied to a stricture, a regular paroxysm of fever, called by the patient an ague, takes place; and this has been so violent as to render it impossible to pursue this mode of practice. Of this I have met with two instances. I consider this disposition to fever as the effect of climate, and not of any natural peculiarity of constitution; for the brother of one of these patients laboured under the same disease, but as he had not been in warm climates, it was removed by the caustic without his experiencing such attacks."

In *gouty* constitutions, attacks of the gout have in two instances brought on spasmodic constrictions, after the stricture had been removed by caustic. This, however, cannot be called a failure of the caustic. It only shows that gout can affect strictures, and reproduce them.

"In some patients the strictures are so obdurate, that the use of the caustic is necessary to be continued for a longer time, than the parts can bear its application, or even that of the bougie passing along the urethra; irritation therefore comes on, and stops the progress of the cure, and when the same means are resorted to again, the same thing takes place. The cases of failure of this kind that I have met with, some of which may yet ultimately be cured, if the patients will take the necessary steps for that purpose, amount in all to six.

"In some patients the stricture is readily removed by the caustic, but, in a few weeks contracts again. The stricture being wholly spasmodic, the caustic, by taking off the spasm, is allowed to pass through, and cannot completely destroy the stricture. Of this kind I have met with one instance which I must consider as a failure, as I have hitherto been unable to get the better of it.

"In those cases where the caustic gradually removes the stricture, and brings the urethra to a size that allows the patient to make water perfectly well, if there is any return, it is not to be attributed to the failure of the caustic, but to the want of proper management, either from the caustic being too small, or its use left off too soon; but all such cases are, I believe, within the power of being cured by the caustic, if its use is recurred to when that is found necessary."

For the generality of strictures in the urethra, which do not occupy more extent of the canal than if caused by a piece of packthread being tied round it, bougies, armed with lunar caustic, answer very well, and so, I believe, do common bougies, to which the general preference ought perhaps to be given. For cases, also, in which the urethra is diminished in diameter, for an inch or more, common bougies must be most advantageous, that is to say, when they can be introduced through the stricture, so as to cure it on the principle of dilatation.

Whether, in certain cases, where no progress can be made with common bougies, it is better to try caustic, or attempt to force the obstruction with a sound, is a question on which there is a great deal of difference of opinion. "The practice of pressing firm bougies, or metallic instruments, so as to force the stricture, or to produce an ulceration of it, (says a modern writer,) so frequently has been found to form false passages, fistulæ, and gangrene, that I need here make no further observation on the practice, or its consequences. All the advantages that can be gained by pressure, tearing through the stricture, or producing ulceration of it, may be obtained by a careful and judicious use of the caustic, which will be found on the whole a safer application, and will be attended with less inflammation and pain." (*Wilson on the Male Urinary and Genital Organs, p.* 383.) This gentleman is not, however, an advocate for the caustic in every case. "I consider it," says he, "the safest practice in cases which will not yield to the introduction of bougies, and which require a portion of the stricture to be destroyed; but the symptoms which sometimes attend its use, and the injury which may be done by its improper application, should confine it to *those* cases." (*p.* 385.)

I shall conclude this part of the subject of strictures, with inserting some of the general directions given by Sir E. Home how to arm the bougie, and apply the lunar caustic to strictures.

In arming a bougie, it will be difficult to get a piece of caustic of a proper shape and size for the purpose, unless it be cast in a small cylindrical mould. "If these pieces are thicker than the bougie can readily enclose, by putting them in water the outside quickly dissolves, so as to diminish their size as much as is required. The piece of caustic, so prepared, is to be cut into small portions, about a quarter of an inch in length, and an orifice being made in the end of a bougie, the caustic is to be inserted into it, and the bougie rolled so as to be made perfectly smooth, taking care that the sides of the caustic are every where covered, and only the end exposed.

"This was the mode (says Sir Everard) in which I armed bougies, when I first took up this practice; but it happened, that, in two or three instances, the caustic was left in the urethra; that canal, when in a very irritable state, grasped the bougie, and pulled the caustic out; I was therefore led to consider how such an accident might be prevented, and applied to the makers of bougies for that purpose. Mr. Pass, the late beadle of the Surgeon's Company, who dealt in bougies, discovered a very ingenious and effectual mode of securing the caustic. In forming the bougie, a piece of wire, the size of the caustic, is rolled up along with it, passing into the substance for half an inch; when the bougie is nearly finished, the wire is withdrawn, and the caustic inserted in its place; after this, the bougie is rolled again, so that the sides of the caustic become firmly cemented to the linen, by means of the composition of the bougie, and when cold, cannot be separated by any force. In this way bougies are now generally armed.

"After the bougie has been thus prepared, the distance of the stricture from the external orifice is to be measured, and the canal cleared by passing a common bougie fully as large as that which is armed. The armed bougie, with the distance marked upon it, is then to be introduced, and applied to the stricture; when it is brought in contact with the obstruction, it is to be steadily retained there, with a moderate degree of pressure at first, and less as it is longer continued, since the bougie becomes soft by remaining in the urethra, and readily bends if the pressure is too great. The time it is to remain depends a good deal upon the sensations of the patient, and the length of time the parts have been diseased; but on the first trial it should be less than a minute, as it then commonly gives greater pain than on any subsequent application. The pain produced by the caustic is not felt so immediately as it would be natural to expect; the first sensation arises from the pressure of the bougie on the stricture; a little afterward, there is the feeling of heat in the parts; and lastly, that of pain.

"As soon as the caustic begins to act, the surgeon who makes the application is made sensible of it by the smaller arteries of the parts beating with unusual violence, which is very distinctly felt by the finger and thumb that grasp the penis.

"The pain that is brought on by the caustic lasts for some time after it is withdrawn; but this period differs in almost every patient, being sometimes extended to half an hour, and sometimes only a few minutes.

"The kind of pain is heat and soreness, which is not severe, not being accompanied with the peculiar irritation, upon so many occasions experienced by patients who have strictures; an irritation that cannot be described, which is most insupportable, and is too often brought on by dilating strictures with the bougie." In the vol. from which the above directions are taken, Sir Everard Home recommends the patient to make water, as soon as the armed bougie is withdrawn; but in a subsequent vol. he explains his change of opinion upon this point: "I not only have no wish that the patient should make water immediately after the application, but would rather that it be retained some time." (*On Strictures, vol.* 3, *p.* 51. 8*vo. Lond.* 1821.)

"It happens not unfrequently," says Sir Everard Home, "that at the first time of making water, some blood passes along with it. This is rather favourable; as, when the parts bleed, the stricture usually proves to be so far destroyed, that at the next trial the bougie passes through it. Every other day appears, in general, to be as often as it is prudent to apply the caustic. I have, however, done it every day in very obstinate cases, where the parts are less sensible, without any detriment."

In his third volume, lately published, he states, that he now rarely passes the bougie oftener than every third day, and never when the pain from the last application has not entirely gone off. He also never continues any one application beyond the time when the pain begins to extend further than the spot to which the armed bougie is applied. (*Vol.* 3, *p.* 51.)

The bougie which is passed down to prepare the way for the caustic, and measure the distance for the armed bougie, must be made of soft materials, that it may readily receive an impression from the part against which it is pressed, and its colour should be light, so as to admit of those impressions being more distinctly seen. With the assistance of such bougies, I am able to discover the size and shape of the orifice of the stricture; to ascertain with accuracy the progress of the caustic upon it; to see whether it is on one side of the canal, or equally all round; and to apply the caustic accordingly.

"When the soft bougie passes through the stricture, by leaving it in the canal a few minutes, it can be known whether the stricture is completely destroyed or only relaxed; in the last case, there is an impression on the side of the bougie." (*Home on Strictures, vol.* 1.)

CURE OF STRICTURES WITH THE POTASSA FUSA.

Mr. Whately, in his publication on strictures, endeavours to convince the reader, that they are not merely contracted fibres of the urethra, but really diseased portions of the membrane lining that canal, with a continued disposition to increased contraction. Hence this gentleman seems to conceive, that the application of a remedy, calculated both to remove the diseased affection, and to dilate the contracted part, might perfectly cure the complaint, without putting the patient to the inconvenience of wearing a bougie. Mr. Whately affirms, that such a remedy is caustic, when judiciously used. Hitherto the lunar caustic has been chiefly employed; but this gentleman states, that it has been his good fortune to discover a more efficacious, and at the same time a less painful and hazardous remedy for the disease in question. The potassa fusa is the application alluded to, which Mr. Whately says, if used in the manner and with the precautions about to be described, will be found to possess singular efficacy in curing the complaint. He avows, that he has already had so much experience of it, and that he is so perfectly convinced of its superiority over the lunar caustic, as well as over the common bougie, that he now uses it in a considerable number of the cases which come under his care. Of its safety he is also as well convinced as of its efficacy; for if used with circumspection, experience proves that there is little danger of its producing any disagreeable effect.

However, if the potassa fusa be applied while the parts are in a highly inflamed, or irritable state, or (as Mr. Whately expresses himself) tending to gangrene; if the habit be bad, and the patient very far advanced in years, the most mischievous effects may be expected from the application; and the use of any kind of caustic, under such circumstances, for strictures in the urethra, is censured as dangerous in the extreme.

Mr. Whately represents, that if the patient be affected with fever, or any other acute disease; if he be much indisposed from any cause; if, in particular, he have a gonorrhœa, attended with much inflammation and irritation in the urethra; if the prepuce, glans, or any other part of the penis, or the parts adjoining to it, be swelled and inflamed; if the urethra, and especially the strictured part of it, be so irritable as not to bear the touch of a bougie; the use of the caustic is for the present forbidden. Mr. Whately also enjoins great caution in applying this remedy to persons advanced in years. Even when no objections of the above kind exist, the caustic should not be resorted to in the first instance. Mr. Whately maintains, that in every case of stricture, before venturing to employ the caustic, we ought to be able to pass into the bladder a bougie of at least a size larger than one of the finest sort. This is necessary, both to let the caustic be applied to the whole surface of the stricture, and to relieve a retention of urine, should it occur during the use of the caustic.

When a bougie of the preceding description can be introduced, without occasioning pain, faintness, or great dejection of spirits, the use of caustic may commence immediately, provided none of the above-described objections exist.

When the urethra is very irritable, Mr. Whately recommends a common bougie to be introduced every day, and kept in the urethra; at first, for a few minutes only; but by degrees for a longer time; till the irritability of the parts has been sufficiently lessened.

When the urethra is rendered so impervious by a stricture, that a small bougie cannot be passed into the bladder, which viscus is also in a painful inflamed state, Mr. Whately asserts, that caustic, in any form or quantity, must not be immediately employed; but that the stricture should be first rendered capable of allowing a bougie a little larger than one of the finest size, to be introduced into the bladder. When this is done, the urine is more freely evacuated, and the consequent irritation and inflammation of the bladder lessened, if not removed, together with the danger of a retention of urine. Caustic may then be advantageously conveyed into the centre of the stricture.

Mr. Whately considers the practice of at once thrusting down, in this sort of case, an armed bougie considerably larger than the narrowest part of the contracted canal, as most dangerous, and horridly painful. For, says this gentleman, it frequently happens, that nearly the whole of the urethra anterior to the bulb is so much contracted by numerous and uncommonly rigid strictures, that it is impossible, by any art whatever, to dilate the passage to its natural size. If, therefore, the canal, whilst in such a state, be rudely torn open by a large caustic bougie, hemorrhage, pain, dangerous suppressions of urine, inflammation, mortification, and death itself, must sometimes inevitably ensue,—even before the caustic can be applied to the principal seat of the disease. In cases like the one just mentioned, the first step preparatory to the use of the caustic should be, according to Mr. Whately, to dilate the strictured part of the urethra; for which purpose, he advises the slow and gentle introduction of a fine bougie, with its point inclined to the lower side of the canal, in order to avoid the large lacunæ situated on its upper part. When the surgeon, by steady perseverance and dexterity, has succeeded in getting a fine bougie through the worst stricture into the bladder, the instrument should be worn for a few hours every day, till the passage is sufficiently dilated to admit a larger one.

Mr. Whately, after explaining that caustic potassa ought not to be applied to strictures of the urethra till a bougie of a proper size can be passed into the bladder, pointing out the methods to be taken before applying this caustic, and enumerating certain cases and circumstances in which its employment is interdicted, next proceeds to describe the mode of practice, which it is the particular object of his book to recommend.

For the purpose of arming a bougie, Mr. Whately advises us to put a small quantity of caustic potassa upon a piece of strong paper, and to break the bit of caustic with a hammer into small pieces of about the size of large and small pins' heads. In doing this, care should be taken not to reduce it to powder. Thus broken, it should be kept for use in a phial, closed with a ground stopper. The bougie should have a proper degree of curvature given to it, by drawing it several times between the finger and thumb of the left hand.

Mr. Whately next acquaints us, that before the caustic is inserted into the bougie, it is necessary to ascertain the exact distance of the stricture, (to which the caustic is to be applied,) from the extremity of the penis. For this purpose, the bougie, which should be just large enough to enter the stricture with some degree of tightness, ought to be gently introduced into the urethra; and when its point stops at the stricture, which it almost always does before it will enter it, a notch is to be made with the finger-nail on the upper or curved portion of the bougie, on the outside of the urethra, exactly half an inch from the extremity of the penis. When the bougie is withdrawn, a small hole, about the sixteenth part of an inch deep, should be made at the extremity of its rounded end. A large blanket-pin, two inches and a half in length, with the head struck off, will answer the purpose; the hole being made with the point of the pin. The extremity of the bougie should then be made perfectly smooth with the finger and thumb, taking care that, in doing this, the hole in its centre be not closed. Some of the broken caustic should then be put on a piece of writing paper, and a piece less in size than the smallest pin's head should be selected; the particle, indeed, says Mr. Whately, cannot be too small for the first application. Let this be inserted into the hole of the bougie with a pocket-knife, spatula, or some such instrument; and pushed into it with the blunt end of the pin, so as to make the caustic sink a very little below the margin of the hole. To prevent the potassa fusa from coming out, the hole should then be contracted a little with the finger, and the remaining vacancy in it is to be filled with hog's lard. This last substance (continues Mr. Whately) will prevent the caustic from acting on the sound part of the urethra, as the bougie passes to the stricture. When the bougie is quite prepared, let it be first oiled, and immediately afterward introduced, by a very gentle motion, with the curvature upwards as far as the anterior part of the stricture, upon which the caustic is to be applied. In doing this, the end of the bougie, held by the finger and thumb, should be a good deal inclined towards the abdomen, on the first introduction of the instrument, in order to prevent its curvature. After it has passed about five inches, this end should be gradually brought downwards, as the bougie passes on, till it forms a right angle with the body. The bougie is known to have arrived at the stricture by the resistance made to its progress.

As soon as the bougie has reached the anterior part of the stricture, it should rest there for a few seconds, that the caustic may begin to dissolve. It should then be pushed very gently forward about one-eighth of an inch; after which, there should be another pause for a second or two. The bougie should then be carried forward in the same gentle manner till it has got through the stricture. The sense of feeling will generally inform the operator when the point of the bougie has proceeded so far; but the notch in the bougie is to be an additional guide, by becoming very near the orifice of the urethra when the end of the instrument has just got through the stricture.

The bougie should now be immediately withdrawn by a very gentle motion to the part at which it was first made to rest awhile. Then it should be very slowly passed through the stricture a second time; but without letting the bougie stop in its passage. If the patient complain of pain, or be faint, the bougie should be immediately withdrawn; but, if these effects are not produced, we may repeat the operation of passing and withdrawing the bougie through the stricture once or twice more before we finish the operation, which will take up, in the whole, about two minutes.

The first application of the potassa fusa, in this manner, gives, according to Mr. Whately's account, a very little pain. A slight scalding in making water, and a trifling discharge during the first day or two, however, are commonly produced.

At the end of seven days the application of the caustic is to be repeated in the same manner. When the first application has enlarged the aperture of the stricture, which may be known by passing a bougie through it of the same size as that by which the caustic was conveyed, the bougie used in the second operation should be a size larger than the one used in the first; but it must not be too large to pass through the stricture. If the patient had no pain on the first application, the bit of potassa fusa may also be trivially larger. At the end of seven days more, the armed bougie should be introduced a third time. At this, and all future applications, the bougie should be increased in size in proportion as the aperture in the stricture becomes dilated. The quantity of caustic, however, is never to be increased in a ratio to the size of the bougie. In no cases whatever does Mr. Whately apply more of the potassa fusa at a time than a piece about the size of a common pin's head. Twelve bits of the largest size, which this gentleman ever uses, weigh one grain.

When there are several strictures, the potassa fusa should be generally applied to only one at a time.

An interval of seven days is what Mr. Whately generally allows to elapse between the applications of the caustic. The rule, however, may now and then be deviated from; but the potassa fusa ought never to be reapplied till the action of the last application has completely ceased. In a few instances, the interval may only be five days; in some others, it may be eight, nine, or even a longer space.

In the above method of using the potassa fusa, Mr. Whately represents that this substance is equally diffused over every part of the strictured surface, and only *abrades* the membrane of the stricture, without producing a slough. The *degree* of this abrasion, he says, may be increased or lessened as circumstances dictate, by paying attention to the quantity of the caustic.

The foregoing account will suffice for conveying an adequate idea of Mr. Whately's method. I am sorry I cannot add my favourable opinion of the practice. To *abrade*, without destroying, is rather too nice a distinction for a practical man, doing business as it were in the dark. Nor can I conceive, that a liquid caustic (for so it is represented as becoming) can be applied with the accuracy to strictures, which Mr. Whately seems to suppose happens. This, however, is merely my own sentiment; and I do not wish to conceal that there are yet a few surgeons who believe that Mr. Whately's plan is the most eligible for all cases, in which the stricture is irritable, or far advanced. (See *Howship's Pract. Obs. on the Urinary Organs, p.* 207.) On the other hand, I know some very eminent surgeons, who formerly took up this practice with great zeal, yet now have entirely abandoned it. I consider it myself the worst and most random mode of applying caustic to strictures, and more likely to act on the sound than the diseased portion of the urethra.

Upon the whole, I may safely declare, that caustic bougies are now much less frequently used by the best surgeons in London than they were about fifteen years ago. Several distinguished practitioners, who to my knowledge were then accustomed to recommend and employ them, have at present returned either to the use of common bougies, or those made of metal, or elastic gum, to which, after many comparative trials, I acknowledge, a general, but not universal, preference seems to me to be due. We learn from M. Roux, that caustic bougies never had many advocates in France; and the inquiries which he made when he was in London authorized him to announce to his countrymen after his return, that such instruments are at present not more in general favour here than they are at Paris. (See *Voyage fait à Londres en* 1814, *ou Parallèle de la Chirurgie Angloise, &c. p.* 315.)

Cases of stricture, however, where the disease is far advanced, of long standing, and attended with such obstruction that no kind of common bougie can be introduced, appear to me to be the examples in which the employment of bougies, armed with the nitrate of silver, ought principally to be continued. This mode seems to me less violent than that of employing a common bougie, or iron sound, with sufficient force to make its way through the stricture by laceration. It must also be attended with less risk of rupturing the urethra, and producing a false passage. At the same time, if the stricture occupy some length of the passage, and a common bougie, which is the best instrument in this circumstance, cannot be introduced through the obstruction so as to dilate it, I believe a passage through it must often be attempted on the principle of exciting ulceration, and that for this purpose a sound or metallic catheter should be employed. In the first instance, however, I would try the armed bougie. I have already explained that the armed bougie has likewise been particularly recommended for what has been termed the *irritable* stricture; and it is even declared, in Sir Everard's third volume, that lunar caustic has a greater power of removing spasm than any other kind of caustic.

A Treatise on the Venereal Disease, by John Hunter, 2d Edit. Practical Obs. on the Treatment of Strictures in the Urethra and Œsophagus, by Sir Everard Home, in 3 Vols. 8vo. Lond. An Improved Method of Treating Strictures in the Urethra, by Thomas Whately, Edit. 2, 1806. *M. W. Andrews's Obs. on the Application of Lunar Caustic to Strictures in the Urethra and Œsophagus,* 8vo. *Lond.* 1807. *T. Luxmore's Practical Observations on Strictures, &c.* 8vo. *Lond.* 1809. *Howship's Practical Obs. on the Diseases of the Urinary Organs,* 8vo. *Lond.* 1816. *Soemmering Abhandlung über die schnell und langsam tödtlichen Krankheiten der Harnblase und Harnrohre bey Männern im hohen Alter.* 4to. *Frankf.* 1809. *Letters concerning the Diseases of the Urethra, by C. Bell,* 1810; *subsequently republished with additions by Mr. Shaw. James Wilson, Lectures on the Structure and Physiology of the Male Urinary and Genital Organs, and their Diseases,* 8vo. *Lond.* 1821. *James Arnott, a Treatise on Stricture of the Urethra,* 8vo. *Lond.* 1819. *Having given an account of this gentleman's dilator, and his method of treatment, in the 2d Vol. of the last edition of the First Lines of the Practice of Surgery, I have not considered it necessary to repeat the statement in the present work. J. Cross, Sketches of the Medical Schools of Paris, p.* 111, *&c.* 8vo. *Lond.* 1815.

URETHRA, FALSE PASSAGE IN. One of the worst consequences of using catheters and bougies in an improper manner, is the rupture of the urethra, or the formation of a false passage by ulceration. With bougies, this accident is generally occasioned by trials to excite ulceration by the application of the end of the bougie to the stricture, when this instrument cannot be passed through it. When once the new passage has been formed, whenever the bougie is introduced, it cannot be hindered from going into the false track, and its action on the stricture is altogether frustrated.

In this kind of case Mr. Hunter has advised the following operation to be practised. Pass a staff, or any such instrument into the urethra as far as it will go, which will probably be to the bottom of the new passage, and this, we may be certain, is beyond the stricture. Feel for the end of the instrument externally, and cut upon it, making the wound about an inch long, if the disease be before the scrotum; and an inch and a half, or more, if in the perineum. If the new passage be between the urethra and body of the penis, you will most probably get into the sound urethra, before you come to the instrument, or new passsage. If so, introduce a probe into the urethra, through the wound, and pass it towards the glans penis, or, in other words, towards the stricture. When it meets with an obstruction, this must be the stricture, which is now to be got through, and afterward dilated. To complete the operation, withdraw the probe, and, instead of it introduce a hollow cannula forwards to the stricture. Then introduce another cannula from the glans downward, till the two tubes are opposite each other, having the stricture between them. An assistant is now to take hold of the urethra on the outside, with his finger and thumb, just where the two cannulæ meet, in order to keep them in their places. Through the upper cannula next introduce a piercing instrument, which is to perforate the stricture, and enter the lower cannula. The piercing instrument is now to be withdrawn, and a bougie introduced through the first cannula and stricture, into the second cannula. The tubes are to be withdrawn, and the end of the bougie, in the wound, directed into the bladder, through the further portion of the urethra. It may also be necessary to lay the whole of the false passage open, in order to make it heal; for otherwise it might still obstruct the future passage of bougies into the proper canal.

When the new passage is between the skin and urethra, the surgeon must extend his incision more deeply, for the purpose of finding out the natural passage. Then he is to proceed as above explained.

The longer the first bougie is allowed to remain in the canal, the more readily will the second pass. The bougies must be gradually increased in size, and used till the wound is healed. The only improvement which seems proper to be made in this plan, is to employ flexible gum-catheters, which might be worn longer than common bougies, as the patient could void his urine through them. (See *Hunter on the Venereal Disease.*) *Additional Observations on this subject are contained in the 2d vol. of the First Lines of Surgery.*

URINARY ABSCESSES. Extravasations of urine may be in three different states. This fluid may be collected in a particular pouch; it may be widely diffused in the cellular membrane; or, lastly, it may present itself in a purulent form, after having excited inflammation and suppuration in the parts, among which it is situated. This case is termed an urinary abscess.

Such extravasations of urine always imply a rupture, either in the kidneys or ureters, the bladder or the urethra. The solution of continuity may be produced by a variety of causes. It is most frequently the effect of a forcible distention of these passages, in consequence of a retention of urine. The bursting of phlegmonous abscesses into the same passages, may occasion the breach. It may also be produced by the penetration of the parts with a sword, or other foreign body: there are likewise examples of effusion of urine from the displacement of the cannula of the trocar, after the operation of puncturing the bladder. Others are caused by false passages in the urethra; or by violent contusions of the perineum, attended with laceration of the urethra.

In *Desault's Surgical Works,* (*T.* 3.) it is observed, that the ravages, which extravasated urine makes, are usually greater and more extensive, when it enters the cellular membrane, than when it is confined in a particular cyst. The mischief is also less when the excretory passage is free, than when it is closed by any obstacle, as in cases of retention. The more or less loose texture of the parts in which such effusions happen, likewise makes a considerable difference in their progress and formation. When the pelvis, or infundibulum of the kidney, or the upper part of the ureter, gives way, the urine is commonly effused in the loins and the fossæ iliacæ, between the peritoneum and the adjacent parts. When the lower part of the ureter, or the bladder, near its lower portion, gives way, the extravasation is generally included within the pelvis.

But when the rupture occurs in the anterior parietes of the bladder, near its upper part, and especially when it takes place at a time when this organ is extremely distended and dilated, the urine becomes effused behind and above the pubes, sometimes ascends to the epigastric region, between the peritoneum and the abdominal muscles, and after having followed the course of the spermatic vessels, it often makes its exit at the ring, and is extravasated in the groins and scrotum. If the rupture has happened in the urethra, the most common situation of the effusion is in the perineum and scrotum. The extravasation frequently extends to the penis and upper part of the thighs, and even sometimes propagates itself under the skin of the abdomen, up to the hypochondria and sides of the chest.

There is no fluid, the extravasation of which is so fatal, as that of the urine. If it is not promptly discharged, it soon excites suppuration and sloughing of the cellular membrane, a gangrenous inflammation of the skin, and almost always a mortification of the parts among which it flows.

While the extravasation of urine is confined to the interior of the pelvis, and lumbar and iliac regions, without manifesting itself externally, there is no certain sign of its existence. The circumstances which may be recollected, however, joined with the symptoms which the patient complains of, may lead to a suspicion of the extravasation. Thus, when in consequence of a retention of urine in the ureters or bladder, the patient has suddenly experienced great relief, without any of the urine having been discharged the natural way; when he has at the same instant felt a kind of pricking in the loins, or pelvis; when to the ease, which lasted only a few hours, symptoms, more severe than the former ones, have succeeded, such as violent fever, hiccough, vomiting, &c. an internal extravasation is to be suspected.

As soon as the extravasation is apparent externally, the case is announced by symptoms which hardly ever deceive. The preceding retention of urine; the sudden appearance of the swelling caused by this fluid; the rapid progress of the tumour; the kind of crepitation perceptible in it, like that which occurs in emphysema; the shining tension and œdema of the skin; the diminution of such symptoms as depended entirely upon the retention; are the first changes which are observable, when the extravasation is somewhat considerable.

If the patient is not speedily assisted, and the urine continues to be extravasated, the tumour spreads more and more; the skin assumes a red violet colour; gangrenous eschars are formed, the separation of which gives issue to a very fetid sanies, in which the smell of urine is readily distinguishable. Portions of dead cellular membrane are presently discharged together with the sanies; the ulcer grows larger; and the dressings are continually wet with the urine.

When one of the ureters has given way, and an urinary abscess is formed in the loins, the aid to be derived from surgery is limited to making an opening in the extravasation, as soon as it can be felt externally. It is then not in the power of art to reestablish the natural course of the urine, or to hinder this fluid from passing through the wound, and rendering it fistulous. However, there are some circumstances in which a radical cure may be attempted. For example, if the abscess were produced by a calculus lodged in the infundibulum, or ureter, and it could be felt and taken hold of with a pair of forceps, introduced into the opening, the extraction of the foreign body might promote the healing of the ulcer, by rendering the natural channel for the urine free.

When the opening, by which the urine has become extravasated, exists in the bladder or urethra, one indication that does not present itself in the foregoing case, may be fulfilled, viz. the urine may be drawn off by means of a catheter passed into the bladder, and kept there. By this means, we not only immediately stop the progress of the extravasation, but attack the very cause of the malady, by removing the obstacles which oppose the natural course of the urine. The introduction of the catheter then becomes a matter of the most urgent necessity. This operation is often attended with the greatest difficulties. Besides the ordinary obstruction of the canal, we have also to surmount the obstacles which the urinary swellings situated in the course of the urethra, create to the passage of the instrument. When these tumours are considerable, they ought to be opened before the catheter is employed. The subsidence of the swellings would render catheterism more easy. Besides, Desault was assured by daily experience, that with a little skill, exercise, and patience, the catheter might always be got into the bladder. If, however, the thing could not be done, ought we to puncture the bladder, or have recourse to the operation termed by the French boutonnière?

Desault was an advocate for neither of these proceedings: he thought it was a more simple and beneficial practice merely to make an external opening in the collection of effused urine. This measure would both afford an outlet for the urine, and arrest the extension of the extravasation. Besides, such an opening is often indispensably requisite for the purpose of putting a stop to the symptoms depending upon the effusion and stagnation of the urine. But if the catheter can be introduced, there may be cases in which an opening would not only be useless, but hurtful; for instance, when the swelling caused by the urine is of little extent, or when it is situated in the thickness of the parietes of the passage, or along its track, it almost always admits of dispersion by the simple employment of the catheter. But it seldom happens, that this swelling, however small, ends in resolution; it almost always suppurates; yet, as it breaks into the urethra, the matter escapes between this canal and the catheter, and renders the making of an external opening needless. Experience teaches us, also, that when the tumour is situated in the scrotum, or between the root of the penis and the symphysis pubis, even after the healing of the incisions made in these situations, a fistula will often remain, which is very difficult of cure. With the exception of these particular cases, Desault was an advocate for opening all urinary abscesses.

The manner of opening such collections varies according as the urine may be in one cavity, or widely effused in the cellular membrane. In the first case, a simple incision, the whole length of the cavity, will suffice for emptying and healing it. In the second, if the extravasation is extensive, the incisions must be multiplied. It would be absurd to spare the parts; for all those, with which the urine has come into contact, seldom escape mortification. The incisions which are made, hardly ever have the effect of saving them; but by accelerating the discharge of putrid sanies and stagnant urine, they prevent mischief, which would originate from a further lodgment. At all events, when the operation is at all delayed, the destruction of all the parts in contact with this irritating fluid, is inevitable. The approach of mortification is indicated by the crepitation under the bistoury, resembling the kind of noise produced by tearing parchment. The extent and depth of the incisions must be proportioned to those of the abscess. When the extravasation occupies the scrotum, long deep scarifications should be made in that part, as well as in the skin of the penis, and in every place where the urine is effused.

Practitioners, unaccustomed to see such diseases, would be alarmed at the extent of the sore produced by the separation of the eschars. Sometimes the whole scrotum, skin of the penis, and that of the groins, perinæum, and upper part of the thigh, mortify, and the naked testicles hang by the spermatic chords, in the midst of this enormous ulcer. It is hardly conceivable how cicatrization could take place over the exposed testicles; but the resources of nature are unlimited. She unites the testicles and the chords to the subjacent parts, and drawing the skin from the circumference to the centre of the ulcer, she covers these organs again, and furnishes them with a sort of new scrotum. This statement is founded upon numerous cases, in which nature always followed this course. The cicatrization of the ulcer is even more expeditious than might be apprehended, considering its extent. In all this business, what does art do? If the introduction of the catheter is excepted, which indeed is absolutely necessary for the radical cure, her assistance is very limited, and almost nothing, in the generality of instances; for, when patients are not exhausted by the tediousness of the disorder, when they are of a good constitution, and in the prime of life, they get well as quickly and certainly with the aid of a good diet and simple dressings, as when they take internal medicines, and use a multiplicity of compound topical applications. The practice of Desault at the Hôtel-Dieu, consisted in applying emollient poultices, until the sloughs were detached. The ulcer was then sometimes dressed with pledgets charged with styrax; but frequently mere dry lint was used, and continued till the cure was completed. If any complication occurred in the course of the treatment, suitable remedies were prescribed for it. Thus, when prostration of strength and tendency to sloughing existed, bark, cordials, and antiseptics were ordered. But in every case, the catheter is the essential means of cure; without it, the treatment is almost always imperfect, and the ulcer will not heal without leaving several urinary fistulæ. (See *Œuvres Chir. de Desault, par Bichat, T.* 3, *p.* 277—287.)

URINARY CALCULI. A true explanation of the nature of urinary calculi was quite impossible, before chymistry had made considerable progress, and the methods of analysis had advanced a great way towards perfection; and as will appear in the course of this article, all the valuable knowledge which now exists upon this subject, is in reality the fruit of modern investigations. It is to be regretted, however, that our information on many points is far from being settled, or complete, as any impartial and judicious reader may soon convince himself by a reference to the able and scientific views, lately taken by Dr. Prout, of various questions, relative to the formation of gravel and calculi, and the treatment of such cases in all their varieties. (See *An Inquiry into the Nature and Treatment of Gravel and Calculus, and other Diseases connected with a deranged operation of the Urinary Organs,* 8vo. *Lond.* 1821.)

Mechanical deposites from the urine are divided by Dr. Prout into three classes. 1. Pulverulent, or amorphous sediments. 2. Crystalline sediments, usually denominated gravel. 3. Solid concretions, or calculi, formed by the aggregation of these sediments.

Pulverulent, or *amorphous sediments,* are described by Dr. Prout, as almost always existing in a state of solution in the urine before it is discharged, and even afterward until it begins to cool, when they are deposited in the state of a fine powder, the particles of which do not appear to be crystalline. Their colour is for the most part brown, or yellow, and generally speaking, they consist of two species of neutral saline compounds; viz. the lithates of ammonia, soda, and lime, tinged more or less with the colouring principle of the urine, and with the purpurates of the same bases, and constituting what are usually denominated *pink* and *lateritious* sediments; and, secondly, the earthy phosphates, namely, the phosphate of lime, and the triple phosphate of magnesia and ammonia, constituting for the most part sediments nearly white. The two species of sediments are frequently mixed together; though the lithates generally prevail.

Crystalline Sediments, or *Gravel,* are commonly voided in the form of minute angular grains or crystals, composed, 1. Of lithic acid, nearly pure. 2. Of triple phosphate of magnesia and ammonia; and, 3. Of oxalate of lime. The crystals of lithic acid, which are by far the most frequent, are always more or less of a red colour. Those composed of the triple phosphate of magnesia and ammonia are nearly white; while others, composed of the oxalate of lime, which are extremely rare, are of a dark, blackish, green colour. It is further remarked by Dr. Prout, that these different varieties of crystalline deposites are never voided together, though they not unfrequently occur with amorphous sediments. (*Prout, Op. cit. p.* 79, *&c.*)

Solid Concretions, or *Urinary Calculi,* arising from the precipitation and consolidation of the urinary sediments, may be formed in any of the cavities to which the urine has access; and hence, they are met with in the kidneys, ureters, bladder, and urethra. Their various appearances, and chymical properties, will be presently described. Most of them are believed to be originally produced in the kidneys, from which they afterward descend with the urine. To this statement, however, the cases in which calculi are formed upon foreign bodies introduced into the bladder through the urethra, an accidental wound, or some ulcerated communication between the intestines and the bladder, are manifest exceptions. In the centre of urinary calculi, bullets, splinters of bone, pieces of bougies, and wood, pins, needles, nuts, &c. are frequently observed; and it would appear, that a very minute substance is capable of becoming a nucleus; a mere clot of blood, or a little bit of chaff, if not soon voided, being sufficient to lead to the formation of a stone in the bladder. The lithic acid itself is a common nucleus, even where the whole calculus is not of the same material.

That many urinary calculi are originally produced in the kidney, is certain; first, from the severe pain, which the passage of such foreign bodies down the ureter always excites; and, secondly, from their being often discovered in the infundibula and pelvis of that viscus after death. This last fact is well illustrated in the first plate of Dr. Marcet's interesting "*Essay on the Chymical History and Medical Treatment of Calculous Disorders,*" 8vo. 1817. The engraving is taken from a preparation in the Museum of Guy's Hospital. In this instance, there were several calculi closely pressed against each other; but in another example, drawn from a specimen in Mr. Abernethy's museum, the renal concretion was composed of a single mass, which represented a complete cast of the pelvis and part of the infundibula of the kidney. In this form of the disease, the kidney loses at last all vestiges of its natural structure, and is converted into a kind of cyst, filled with the extraneous substance. As Dr. Marcet observes, when such a complete alteration of the structure takes place, the secretion of urine must of course be entirely carried on by the other kidney. However, in some instances, the inconvenience thus produced is so slight, that it almost escapes notice; and sometimes even both kidneys are diseased in a very great degree, and yet life is preserved for a considerable time. (*Op. cit. p.* 3, 4.)

Calculi are sometimes found in the ureters, especially at the upper part; but it is not supposed that they are originally formed there; an event not likely to happen, unless there were some cause retarding the descent of the urine through those tubes. The common belief is, that all calculi, found in the ureter, are first produced in the infundibula and pelvis of the kidney, from which they afterward descend with the urine.

The generality of calculi, however, which leave the kidney, are of small size, and consequently, after a time, and exciting some pain and inconvenience, they usually pass into the cavity of the bladder. Indeed, as Dr. Marcet remarks, the bladder is the most frequent seat of calculi; not only because all urinary concretions, or their nuclei, formed in the kidneys, tend to fall into that organ; but also because a stone may be, and probably often is, originally formed in the bladder itself.

Renal concretions vary considerably in their number, size, and shape. In some cases, a single small calculus has been found occupying one of the foregoing situations; while in other instances, an innumerable collection of calculous substances are observed filling the whole of the cavity of the pelvis and infundibula of the kidney, distending its parietes, and even obstructing the passage of the urine out of this viscus, which is converted into a sort of membranous cyst. Lastly, a single stone in the kidney may acquire a very large size there; or a great number of small calculi, in the same situation, may become cemented together, so as to form one mass of enormous dimensions, and the shape of which invariably corresponds to the space in which it is, as it were, moulded. Hence, renal calculi often present a variety of odd, irregular figures, resembling those commonly observed in specimens of coral.

It has been already remarked, that urinary concretions of large size very often exist in the kidney, without their presence being indicated by any external circumstances, or attended with any symptoms, sufficiently unequivocal to constitute a ground for suspecting the importance of their cause. On the other hand, it is very usual for renal calculi, of middling dimensions, to excite serious and alarming complaints. The reason of this difference becomes obvious, when it is recollected, that smallish concretions are readily carried with the urine into the ureter, and become fixed in the narrow portion of the tube. But very large calculi can be contained only in the upper part of this canal, where its parietes are more yielding, and the space in them more capacious.

Calculi, of middling size, in their passage through the ureter, cause at first, a feeling of heaviness, or an indeterminate sense of uneasiness, and an obtuse pain in the region of the corresponding kidney. These complaints occur at intervals of greater or less duration. At length the pain grows more urgent and annoying, attended with flatulence, heart-burn, frequent vomiting, painful retraction of the testicle, and sometimes acute fever. The patient makes water frequently, and in small quantities at a time; and the urine is high-coloured and bloody. The patient cannot sit upright, his body being bent forwards towards the affected side. These symptoms may have more or less duration, and then suddenly cease. They may also subside, and recur several times successively, with intervals of some days. In the latter case, the pain is felt at each attack to be situated lower in the track of the ureter. Lastly, when the symptoms have entirely disappeared, the urine is more abundant, not so high-coloured, and easily discharged, the stream sometimes bringing out with it the urinary concretion, after its entrance into the bladder.

Suppuration of the kidney, and an abscess in the lumbar region, in consequence of renal calculi, are not very common events. However, these are the only cases of the kind, in which the interposition of surgery can be useful. By adverting to previous circumstances, and irregularity of the pain about the kidney, the practitioner may suspect the nature of a phlegmonous tumour in the situation of this viscus. Whatever may be his conjectures, however, he must carefully abstain from the use of his lancet, until purulent matter is plainly under the integuments. He may then safely make an opening, from which urine and pus will be discharged, and through which the calculi themselves may sometimes be felt and extracted. If they should not be readily touched with a probe, let not the surgeon rashly conceive, that he is justified in endeavouring to discover them with his knife. Their situation may be such as to baffle all his endeavours, and the operation itself might cause a most dangerous hemorrhage, and other fatal mischief. The opening of an abscess of the kidney may remain a long while fistulous, and the circumstance indeed warrant the conclusion, that the healing is prevented by the presence of some extraneous substances; but a prudent practitioner will never think of performing any operation for their extraction, unless they can be distinctly felt, and nature has brought them tolerably near to the surface. (See *Nephrotomy.*)

Urinary calculi, which form upon foreign bodies, accidentally introduced into the bladder, and acting as nuclei, are always single, unless the number of foreign bodies themselves happen to be greater. It is curious also to find, from the observations of Mr. Murray Forbes, (*On Gravel and Gout, p.* 74, *8vo. Lond.* 1793,) and Dr. Marcet, that in such instances the deposition most frequently, if not always, consists of the earthy phosphates, and especially of the fusible calculus. Thus, in the collection of Mr. R. Smith, of Bristol, there is a pin, a piece of bougie, and four pieces of stick, coated with fusible matter. (See *Med. Chir. Trans. Vol.* 11, *p.* 11.) But when calculi originate from a particular diathesis, there may be many of them lodged in the bladder at the same time. Several distinct nuclei may descend successively from the kidneys, and each may increase in a separate manner. Sometimes, however, calculi in the bladder, which are at first distinct and unconnected, become afterward cemented together, so as to make only one mass.

The magnitude of calculi in the bladder is generally in an inverse ratio to their number. Some hundreds have been found in one bladder; but they were not larger than a pea. It is observed by Sir Astley Cooper, that when a great number of calculi are found in the bladder, the circumstance is generally attended with an enlargement of the prostate gland, directly behind which a calculus is formed. In cases of diseased prostate gland, the bladder can seldom be completely emptied, and this partial stagnation of the urine in the sac, here alluded to, is supposed to facilitate the production of calculi. From their number and collision against each other, their surfaces are generally smooth, and their shape is commonly roundish. (See *Med. Chir. Trans. Vol.* 11, *p.* 359, *and art. Prostate Gland.*) Other calculi have been met with of so large a size, that they were more than six inches in diameter. In Fourcroy's museum, and in that of the Ecole de Médecine, at Paris, may be seen some calculi, which filled the whole cavity of the bladder; and in the *Phil. Trans. for* 1809, the late Sir James Earle described an enormous stone, which he extracted after death from the bladder of the late Sir David Ogilvie, who had been unsuccessfully cut for it. This calculus, which was of the fusible kind, weighed forty-four ounces, and was of an oval shape, its long axis measuring sixteen inches, and the shorter fourteen. The average size of vesical calculi may be compared with that of a chesnut, walnut, or a small hen's egg. The size depends very much upon their composition, the largest being of the fusible kind. Their weight differs from a few grains to upwards of fifty ounces; but on an average, it is from two to six ounces. Their weight is not always proportioned to their size; for substances of different qualities enter into their composition, and diversify their heaviness.

The urinary salts, in calculous patients, are not continually precipitated in the same quantities: in some cases, indeed, the process appears to be even suspended for a considerable time. Hence a stone of middling size, already formed, may increase but very slowly, and it has actually happened, that a calculus, which could be plainly felt with a sound, has remained more than ten years in the bladder, and yet, after all this time, been only of a moderate size.

According to Dr. Marcet, the form of urinary calculi is mostly spheroidal, sometimes egg-shaped, but often flattened on two sides, like an almond. (*P.* 50.) Sometimes the calculous matter, which descends from the kidneys, is in the form of minute spherical grains, which have a singular tendency to unite either to each other, or to calculi already lodged in the bladder.

When there are several loose calculi in the bladder together, they seldom lie long in contact with each other, while their size is diminutive, but are incessantly changing their situation as the patient moves about, or alters the position of his body. Hence their increase is at first regular and uniform; but when they have attained a more considerable size, or by their numbers compose a large mass, their relative situation is more permanent, and many of their surfaces being in this manner usually covered, no longer receive any additional depositions. Every other part of these calculi, however, goes on increasing. It is thus that stones, with surfaces corresponding to those of other stones, are produced, and which are aptly denominated by the French writers, "*pierres à facettes.*"

Dr. Marcet has likewise taken notice of the angular shape of certain calculi, and remarked the rare occurrence of their being sometimes almost cubic. His work contains the engraving of a species of calculus, which somewhat resembles a pear, with a circular protuberance at its broader end, apparently moulded in the neck of the bladder.

The same intelligent writer has also particularly considered the variety in the colours and surfaces of calculi, which often afford indications of their chymical nature. "When they have a brownish, or fawn colour, somewhat like mahogany wood, with a smooth, though sometimes finely tuberculated surface, they almost always consist of lithic acid. When cut open, they appear to be formed of concentric layers, sometimes homogeneous, sometimes alternating with other substances. The colour, however, cannot be considered as a certain criterion, since other kinds of calculi may often be coloured in the bladder, in a similar manner, by bloody mucus, or other vitiated secretions.

"When calculi are white, or grayish-white, they always consist of earthy phosphates. This is particularly the case with the species called fusible. And when they are dark brown, or almost black, hard in their texture, and covered with tubercles, or protuberances, they are generally of the species which has been distinguished by the name of *mulberry*, and consists of oxalate of lime.

"Calculi have sometimes an uneven, crystalline surface, studded with shining, transparent particles. This appearance always denotes the presence of the ammoniaco-magnesian phosphate." (*Marcet*, *p.* 52.)

A large calculus, especially when it has a rough irregular surface, produces a great deal of irritation of the bladder, which contracts more closely round it. The contact, however, is remarked to be particularly exact at the transverse line, which extends between the terminations of the two ureters in the bladder; a part of this organ which generally becomes more thickened than the rest. Sometimes, indeed, the cavity of the bladder is nearly effaced, and the urine can be retained only a very short time, or if it be not evacuated, it spreads uniformly round the calculus, especially above and below the above-described transverse projection, which is less yielding than other parts of this organ. Hence, the surface of the stone, towards the orifices of the ureters, does not enlarge so fast as the other sides of it, and a circular groove is produced giving the foreign body the shape of a calabash. Such calculi are generally very large, and sometimes even of enormous size. In the latter circumstance, the foreign body fills the cavity of the bladder so completely, that there is no space left for the lodgement of the urine there, which fluid then generally passes along a sort of groove, situated in a line reaching from the lower termination of the ureter to the neck of the bladder. This state is of course accompanied with a complete incontinence.

Urinary calculi are not always loose and moveable in the cavity of the bladder: being sometimes fixed in various ways to certain points of the circumference of this organ; a subject, which has been noticed in the article *Lithotomy*.

When the bladder protrudes from the abdomen, so as to form a hernia, a stone is occasionally situated in the displaced portion of it. This circumstance has the same effect as the encysted state of a calculus; for the foreign body is thereby fixed, and it cannot be propelled towards the neck of the bladder at the period when the urine is discharged. Also in cases of prolapsus uteri, when the bladder is drawn downwards, a stone has sometimes been found lodged at the lowest part of it. The possibility of the complication of a calculus with such displacements of the bladder, ought to be well remembered, since, if the nature of the case be detected, its treatment becomes materially simplified.

The symptoms of a stone in the bladder have been detailed in the article *Lithotomy*, and therefore need not here be repeated. They are all so equivocal, and bear so great a resemblance to the effects of several other disorders, that they cannot be depended upon, and consequently no well-informed surgeon will venture to pronounce positively, that there is a calculus in the bladder, unless he can distinctly feel it with a sound. (See *Lithotomy* and *Sounding*.) As for the operation, if the surgeon cannot plainly feel the calculus immediately before he commences the incisions, it ought to be postponed.

Notwithstanding the laudable zeal, with which various distinguished physicians and surgeons of the present day, have applied themselves to the consideration of the causes of urinary calculi, the subject is yet in great obscurity. The conjectures which have been started, respecting the influence of particular kinds of food, drink, air, and habits of life, are all of them liable to such objections, as throw considerable doubts on their correctness, and sometimes amount to a decided refutation of them.

If a foreign body be introduced into a cavity, to which the urine has access, whatever may be the nature of the immersed substance, it always becomes after a time incrusted with calculous matter, though it undergoes no chymical change in its composition. In such cases, it is found (See *Forbes on Gravel and Gout*, 8*vo. Lond.* 1793, and *Marcet on the Chymical Hist.*, *&c. of Calculous Disorders*, 8*vo. Lond.* 1817.) that the concretion mostly, if not always, consists of the earthy phosphates. Here, the operation of any particular diathesis is beyond all suspicion, because the foreign body, which forms the nucleus, would lead to the production of a calculus in all descriptions of patients.

There are some countries, where patients with calculi are tolerably numerous; and other parts of the world, where the disease is rare, or never met with; and yet the difference cannot always be accounted for by any geographical circumstance, which is constant, or any definable peculiarity of constitution, climate, diet, or mode of life. One fact, however, I believe is certain, viz. the uniform rarity of the disease in *very hot* countries. In tropical climates, urinary calculi are almost unknown, and, as Dr. Marcet observes, the testimony of Dr. Scott on this point, who long resided in India, must be considered valuable. Dr. Scott affirms, that, between the tropics, he never met with a single instance of the formation of a stone in the urinary bladder, although he knew of some cases which had been imported, and were not cured by climate. (See *Marcet on the Chymical History and Med. Treatment of Calculous Disorders, Chap.* 2, *8vo. Lond.* 1817.) Yet, as calculi frequently form on various nuclei, bullets, pieces of bougies &c. I conceive, that, even in India, calculi will some day or another be found to originate from this cause, though not perhaps from diathesis.

Urinary calculi are said also to be very uncommon in Spain and Africa, though patients with gravel are numerous in Majorca, which lies between them. (*Magendie, Recherces sur les Causes, &c. de la Gravelle, p.* 31, *8vo. Paris,* 1818.) The usual belief is, that calculi are most frequent in damp, cold countries, like England and Holland, but, that in such other parts of the world as are either very hot or cold, the disease is rare. However, in every estimate of this kind, the number of the inhabitants of the countries, or districts in question, is always an essential thing for consideration, because the proportion of stone-patients, in a given number of individuals, is invariably rather small; and, therefore, in referring to the rarity of such patients in very cold countries, it is to be considered, whether the fact may not be, in some measure, ascribable to the fewness of the inhabitants. The state of medicine and surgery, in the countries from which the information is transmitted, is likewise another thing for contemplation, inasmuch as patients are not likely to be reported as suffering from, or dying of stone, where the nature of diseases is not scientifically observed, morbid anatomy is uncultivated, and the operation of sounding never attempted. However, as our East India native regiments are furnished with excellent surgeons, I consider it well proved, that in those regiments the disease is uncommon, for otherwise the statement would no doubt have been contradicted by them. The fact seems therefore well established, in relation to the East Indies. At the same time, the ages of the individuals, to whom any calculation applies, is always to be taken into consideration, before any inference be drawn respecting the cause of the rarity of calculi, because, if the disease be rare among soldiers in India, it is also rare among soldiers in Europe, and therefore climate would not explain the fact in both parts of the world. But, probably, the recollection, that common soldiers are neither children, nor men, above the middle period of life, and that the first formation of stone in youths, adults, and middle-aged persons, is uncommon, unless some extraneous substance happen to enter the bladder and form the nucleus, may furnish a reason for the infrequency of the disease among soldiers, applicable perhaps to such individuals in every country. And that the children of soldiers, like those of other persons, are not exempt from the disease, I know very well, having had occasion myself to operate upon a patient of this kind during my service with the army.

The preceding consideration also of the general age of sailors in the royal navy, and of the little chance there must be of a boy with stone being sent to sea, or of any sailor being admitted on board of a King's ship with that disorder, unless it be wilfully concealed by the man himself, furnish to my mind a better explanation of the cause of so few cases of stone having been met with among seafaring persons, than any of the references to the habits or mode of life of a sailor, made by Mr. C. Hutchison in his ingenious paper. (See *Med. Chir. Trans. Vol.* 9, *p.* 443, *&c.*) From this gentleman's account it seems, that out of 86,000 patients, admitted into the Naval Hospital at Haslar, Plymouth, and Deal, in the space of sixteen years, there has only been eight calculous cases, or one in 10,750 patients. *Two of these cases were boys, about fourteen years of age,* "*who had laboured under symptoms of stone for some years previously to their admission into the service, and into which they had recently entered, expressly for the purpose of deriving benefit from our magnificent institutions;* one was a marine who had been at sea a few months only; three were adult seamen, and the seventh a marine; *but their length of service afloat could not be at all ascertained:* the eighth, and last case, was a warrant officer, *advanced in years,* who had been serving in ordinary, that is, in a ship in harbour for a considerable time previously to the operation." Subsequently to the period, embraced by the returns collected by Mr. C. Hutchison, *a boy* has also been operated upon in Haslar Hospital. (*Vol. cit. p.* 449.) Mr. R. Smith, of Bristol, has published an interesting statistical inquiry into the frequency of stone in the bladder in Great Britain and Ireland, though strictly it is a comparative estimate of the number of operations for stone in different parts of the kingdom in given spaces of time, and not of the number of calculous patients. (See *Med. Chir. Trans. Vol.* 11.) As far as I can judge from the facts stated in Mr. Smith's paper, and from what I know about the average number of operations for stone in London, not more than 180 can be fairly reckoned as the annual total in Great Britain and Ireland, which is about 1 for each 100,000 of the population, taken at 18 millions. Now, if this fact be recollected, in computing the rarity of stone operations in the navy, and the other circumstances of there being few children and old men in that service, and of every man being examined by a surgeon, as to the state of his health, before he is entered, I think the reason of the infrequency of stone in the navy will be tolerably clear. However, as sailors live partly in very hot and partly in very cold climates, even if they were of the ages most subject to calculi, they may perhaps be rather less disposed to the complaint, than individuals of the same periods of life, constantly resident in England. In the cold country of Sweden, urinary calculi are said to be infrequent. (*Richerand, Nosogr. Chir. T.* 3, *p.* 528, *Ed.* 4.;) and, as surgery is there highly cultivated, the uncontradicted statement weighs considerably in favour of the truth of the general belief in the rarity of this disorder in very cold countries. But, as I have already said, the number of inhabitants, to which any particular evidence on this point relates, is an essential inquiry, before a safe inference can be drawn.

It is perfectly well ascertained, that the greater number of urinary calculi are composed chiefly of lithic, or uric acid, which is naturally contained either in a free or combined state in the urine of man, and all other animals, which consume a great deal of food abounding in azote, as flesh of every kind, fish, shellfish, eggs, &c. Whenever the urine will redden the tincture of turnsol, Magendie infers, with the generality of chymists, that it contains lithic acid, the proportion of which, he says, varies according to the quantity of substances abounding in azote, taken as food. And Magendie further observes, that when animals live altogether on flesh, their urine is full of uric acid, and even may be entirely composed of it, as is proved with respect to birds, by the experiments both of Dr. Wollaston and Vauquelin. Here Magendie cannot mean free uric acid, but this acid in a state of combination; for, as Dr. Prout has observed, there is no instance known, in which lithic, or uric acid is secreted in a pure state; birds, serpents, &c. always secrete it in combination with ammonia; in the gouty chalk-stone, it is secreted in combination with soda. (*On the Nature, &c. of Gravel and Calculus, p.* 13.) On the contrary, if animals live on vegetables, as is the case with the herbivorous class, Magendie states that there is no appearance of lithic acid in their urine. In a series of experiments, communicated by Magendie to the Academy of Sciences in 1816, this distinguished physiologist exemplified, that if a carnivorous animal be deprived of all nutriment, containing azote, and be fed with sugar, gum, oil, and other substances considered to be nutritious, and having no azote in their composition, the urine, in three or four weeks, will contain no lithic acid. (See *Mém. sur les Propriétés nutritives des Substances, qui ne contiennent pas d'azote. Paris,* 1817.) A dog, allowed only sugar, and distilled water, soon began to grow lean, and died apparently starved on the 32d day from the commencement of his diet. The inference which Magendie draws from his experiments, and from some cases which he has detailed, is, that the quantity of uric acid in the urine, and of course, the tendency to gravel and calculous disorders, depend very much upon the kind of food. However, he takes into consideration the relative proportion of the uric acid to the urine itself, because if this be also abundant, the liability to calculi is counteracted. It would appear also from his observations, that the urine not only becomes impregnated with a great proportion of uric acid in animals, which eat a large quantity of flesh, but is also scanty; and that, on the other hand, a vegetable diet always promotes the secretion of a large quantity of fluid from the kidneys, as well as checks the formation of the acid in question. Magendie is also disposed to believe, that the rarity of calculi in hot climates may be partly traced to the kind of food employed. In fact, it is well known, that, in a considerable part of Asia, many millions of the inhabitants never eat flesh. But, though this circumstance must be allowed to have full weight, with respect to the sects which religiously decline animal food, the influence of climate cannot be rejected, because calculi are rare in all hot countries, whether meat be freely eaten or not. At the same time, the tenor of this gentleman's reasoning may be true, that, setting out of the question the influence of climate, a vegetable diet tends to prevent the formation of lithic acid calculi, while eating large quantities of such food as contains a great deal of azote, has the opposite effect.

However, Magendie himself is not so partial to his theory, as not to confess that it is liable to objections; for, says he, individuals are met with every day, who from their age, manner of living, and habits, appear to be subjected to every condition, calculated to produce the gravel, and yet they remain free from it. Hence he infers, that there must be some unknown causes which sometimes keep the uric acid dissolved, even where its quantity in the urine is copious. On the other hand, he admits that certain persons are met with, whose regimen and mode of life ought to exempt them from gravel, and still they are afflicted. In proof of this fact, he adverts to the poor inhabitants of a district in Sussex, mentioned by Dr. Scudamore, (*On the Nature and Cure of Gout, &c. 8vo. Lond.* 1817,) who live almost entirely on vegetable matter and hard beer, and many of whom are much troubled with gravel. Magendie might also have recollected, that some birds which live entirely on vegetable matter, as several singing birds kept in cages, void a good deal of the lithate of ammonia. Magendie refers to examples of gravel being always produced in certain individuals after any unusual exertion, and in other apparently healthy subjects, after any difficulty of digestion, flatulence, the eating of salad, raw fruit, &c. With regard to the dyspepsia, frequently attendant on calculous disorders, and other chronic diseases, Magendie sets down the complaints of the stomach and of the urinary organs, as probably only two effects of the same cause, and not mutually productive of each other.

(See *Recherches, &c. sur les Causes, &c. de la Gravelle*. 8vo. *Paris*, 1818.)

It should be observed, that Magendie's observations are meant to apply only to cases of gravel, and where the substance voided is lithic acid. And as for other instances, in which the calculous matter is formed of phosphate of lime, oxalate of lime, cystic oxide, &c. he deems the causes entirely unknown. One thing is certain, that Magendie's theory will not account for the origin of calculi, unless a predisposition to the disease from other unknown or conjectured causes be taken as a matter of fact. Indeed, this admission he makes himself; and he enumerates various circumstances conducive to gravel, besides a diet of food abounding in azote; as advanced age, a sedentary life, and hard study, long retention of the urine in the bladder, strong wines and liquors. In fact, without the predisposition, arising from unknown causes, and particular periods of life, a meat diet will not render the occurrence of calculi frequent, as is exemplified in sailors, who eat a great deal of salt beef and pork. And, on the contrary, that the eating of little, or no animal food will not always prevent the formation of calculi, when there is tendency to it from time of life, diathesis, or other causes, is sufficiently proved by the frequency of the disease in infants, in whose food there is a much smaller proportion of meat and azotic substances than in the usual diet of an adult.

With respect to *amorphous sediments*, the circumstances which Dr. Prout has observed to produce a lithic acid diathesis in persons, subject to slight dyspepsia, but in other respects healthy, are, 1, Simple errors in diet. 2, Unusual, or unnatural exercise, either bodily or mental, particularly after eating, and the want of proper exercise at all other times. 3, Debilitating circumstances. (*On Gravel, Calculus, &c. p.* 113.) An unusually heavy meal, especially of animal food, or bread, he says, is *invariably* followed by a deposition of the lithate of ammonia from the urine. Heavy, unfermented bread, and compact, hard boiled, fat dumplings, or puddings, he finds particularly apt to produce such an effect.

Crystallized sediments, or *gravel*, consisting of nearly pure lithic acid, Dr. Prout ascribes to a free acid being sometimes generated in the kidneys, and combining with the ammonia, with which the lithic acid is previously united, so as to precipitate the latter in a pure crystallized state. According to the investigations of Dr. Prout, the precipitating acid is not constantly the same, though generally the phosphoric and sometimes the sulphuric. (*P.* 127, 128.)

The same intelligent writer represents the circumstances, which promote the formation of urinary sediments in general, as being either *natural* or *acquired*. "With respect to those of the first description, (says he) it cannot I think be doubted, that certain individuals are much more liable to these sediments than others. This tendency is not infrequently inherited: thus, I know a family, where the grandfather and father have actually lithic calculi in the bladder; and where the grandson, a youth of twelve, or thirteen years of age, has a very strong tendency to the same disease; his urine depositing frequently very large quantities of lithic acid, both in the form of amorphous and crystalline sediments. On the other hand, the disposition to generate these sediments in excess is, like gout, or rather simultaneously with gout, but too frequently acquired by indolent habits, and excess in eating and drinking. Most frequently, however, the tendency to these diseases is connected with some unknown causes, peculiar to certain districts or countries," as, for example, the district, of which Norwich may be considered as the centre; in which more calculous cases occur than in the whole of Ireland or Scotland." In such instances the water, diet, temperature, &c. of the district has been each accused, in its turn, of being the exciting cause; but, (says Dr. Prout) the circumstance, I believe, still remains unexplained. I have in one or two instances seen a fit of lithic gravel induced in the predisposed by sitting on a damp cold seat for some hours. Sometimes also a tendency to lithic calculus is evidently connected with local injury, or disease of the kidney." (*P.* 133.)

The difficulty of tracing the causes of the formation of calculi is rather increased, than facilitated, by the fact, that, except when the urinary organs are much diseased, the patient may appear to be in perfect health. Indeed, persons of the strongest constitutions are often troubled with the stone, quite independently of the entrance of any foreign body, as a nucleus, into the bladder; and it is now universally admitted, that lithic acid itself constitutes by far the most common nucleus, even when other calculous matter is deposited round it. (See *Prout on Gravel, p.* 95.) It is sometimes conjectured that the female is less liable than the male sex, to calculi; but whether this is the fact, or whether the circumstance can be satisfactorily explained on another principle, viz. the facility with which any calculi of moderate size are generally discharged through the short and capacious meatus urinarius, are questions perhaps not yet completely settled

Infants and children to the age of twelve, or fourteen, are very liable to stone. However, it is asserted by Delpech, that at this period of life, relapses are infrequent; that is to say, an entirely fresh stone is hardly ever formed again; and, if a return of the complaint happens, the quickness of its recurrence, and an attentive examination of the calculus, will mostly prove, either that the second stone has formed round a fragment of the first, left behind, or that it existed when the former one was taken out, but was not discovered. I am not inclined myself to put much faith in this statement, because it is hardly credible, that the calculous diathesis of childhood can be at all diminished by the circumstance of there having already been one calculus, and of the patient having had the bladder opened for its removal.

Dr. Marcet thinks, that the disorder is frequent only among the children of the poor classes; and that in those of the higher ranks, or even of the lowest classes, *provided they are well fed*, the same frequency is not observed. "In the Foundling Hospital, for instance, within the last 27 years, during which 1151 children have been admitted, only 3 cases of stone have occurred, all of which were among children while at nurse in the country. And, in the Military Asylum at Chelsea, which contains about 1250 children, and into which upwards of 6000 of them have been already admitted, no more than one single case of stone has occurred." (See *Marcet's Essay on Calculous Disorders, p.* 36.) However, supposing that the foregoing statement refers to operations for stone, and that the average number of operations for the population of Great Britain and Ireland, is annually about 1 for each 100,000 inhabitants, the inference drawn by Dr. Marcet, which also does not agree with later statistical reports, cannot be received, because in the total number of children, specified as having been admitted into the above charities, even when every allowance is made for the time comprised in the calculation, the proportion of operations is far beyond the average, with reference to the population in general. And, that stone cases are more numerous in the children of the poor, than in those of the higher classes, is a fact, which perhaps may be explained by the recollection, that the mass of the population consists of the poor and laborious classes.

In the period of life, between the age of twelve, or fourteen, and that of forty, the liability to stone in the bladder, is much less than in infancy, childhood, or old age. And no doubt, many of the cases, which do present themselves in adults, or middle aged individuals, either began at an earlier period of life, or are owing to some extraneous nucleus.

According to Delpech, in old men, who are particularly subject to calculi, the disposition to the return of the disease always continues during life; and hence in them, relapses are frequent. (*Précis des Mal. Chir. T.* 2, *p.* 193, *&c.*)

The following table, collected by Dr. Prout, exhibits the proportion of stone cases before and after puberty, and of their occurrence in the different sexes:

	Bristol.	Leeds.	Norwich.	Total.	Consisting of	
					Males.	Females.
14 years and under,	178	96	235	509		
Above 14 years,	177	101	271	549		
	355	197	506		1014	44

Thus, nearly one half of the whole number of stone cases occur before the completion of the 14*th year;* and it appears also from Mr. Smith's valuable reports, that *there is an evident increase in the number of cases, about the age of* 40 *years.* (See *Prout on Gravel, &c. p.* 210; *and R. Smith, in Med. Chir. Trans. Vol.* 10.)

Dr. Marcet has estimated the comparative frequency of the disease in various countries, and in the different stations of life, and tried to ascertain, whether its frequency be influenced by varieties of climate, or situation, or by peculiarities in our habits and occupations. He instituted inquiries at all the great hospitals of the metropolis, in the hope of getting at some useful records concerning the vast number of patients, on whom lithotomy had been performed in those establishments. In London, he found it impossible to obtain all the particulars of such cases, as no entry of them had been preserved. The Norwich hospital, however, afforded him some details, which are interesting. All the calculi, which have been exracted in that hospital for 44 years, viz. from 1772, to 1816, and which amount to 506, have been carefully preserved, with the circumstances annexed to each stone, and the event of the operation distinctly recorded. Dr. Marcet has given the results of these records in the following table:

	Number of operations.			Deaths.		
	Children under 14.	Adults.	Total.	Children.	Adults.	Total.
Males,	227	251	478	12	56	68
Females,	8	20	28	1	1	2
	235	271	506	13	57	70

It appears, says Dr. Marcet, from the above table, that the mean annual number of cases of lithotomy in the Norwich Hospital, during the last 44 years, has been 11 1-2, or 23 in every two years; and that the total number of fatal cases, in the 506 operations is 70, or 1 in 7 1-4, or 4 in 29. The proportion of females, who have undergone the operation, is to that of males, as 58 to 1000, or about 1 to 17; that the mortality from the operation in children was only about 1 in 18; while, in adults, it was 4 in 19, or nearly quadruple.

According to Mr. Smith, the mortality from lithotomy at the Bristol Infirmary, has been in the following proportions:

Age.	Rate of Mortality.
10 years of age and under,	1 in 4 1-2
Between 10 and 20 ——	1 — 5
20 —— 30 ——	1 — 7
30 —— 40 ——	1 — 5
40 —— 50 ——	1 — 3 1-8
50 —— 60 ——	1 — 4 2-3
60 —— 70 ——	1 — 2 1-2
70 —— 80 ——	1 — 2
Mean at all Ages	1 in 4 1-4

The following table is also from Mr. Smith's paper, and refers to the Leeds Hospital. (See *Med. Chir. Trans. Vol.* 10.)

	Cases of Lithotomy.	died	
From 1767 to 1777	24 of which	2	or 1 in 12
1777 1787	62	8	1 7 3-4
1787 1797	23	3	1 7 2-3
1797 1807	42	7	1 6
1807 1817	46	8	1 5 3-4
Mean at all ages,			1 in 7 4-5

In the Norfolk Infirmary the mortality has been much less in children, than in adults. But at St. Bartholomew's, the proportion of deaths in children, during the 20 years that I frequently attended operations for stone there, was very great. In the Bristol Infirmary, the risk in children seems to have been about equal to what it has been in adults. In all calculations of this kind, however, it is to be recollected, that as operations for the stone are done, not only by surgeons of various degrees of skill, but in different ways, and even with instruments of great diversity, such computations do not give the fair average of any one method of operating.

Now, where the patients are equally favourable, but the results of any given number of operations on them are considerably different, the skill of the surgeons, the particular methods of operating pursued, the kinds of instruments used, the general healthiness of the hospital itself, and the treatment after the patients are put to bed, are considerations, by which questions, apparently inexplicable, might sometimes be solved.

From the year 1772 to 1816, the Norwich Hospital received 18,859 patients of all kinds, making an average of 428 annual admissions; and Dr. Marcet observes, that the proportion of 506 operations of lithotomy, out of 18,859 patients, which corresponds to about 1 in 38, exceeds in an astonishing degree, that obtained from any of the other public institutions, whose records he examined.

Next to the records of the Norwich Hospital, Dr. Marcet derived the most distinct information of this kind from Cheselden, who mentions in his work on anatomy, that during the course of his public practice in St. Thomas's Hospital, a period of about 20 years, he had performed the operation of the stone 213 times, and lost only 20 patients. This was about 2 cases in 21, which is much less than the common average.

In St. Thomas's Hospital, during the last ten years, the operation of lithotomy seems to have been done, on an average, 11 times in each two years; and one case of stone has occurred in each 528 patients admitted.

In St. Bartholomew's, lithotomy was performed 56 times in the years 1812, 1813, 1814, 1815, and 1816. The annual average about 11, or 1 in each 340 patients of all descriptions.

In Guy's Hospital, lithotomy has been performed, on an average, about 9 or 10 times annually, during the last 20, or 30 years. The proportion of calculous patients there is also estimated as 1 in about 300 cases of all kinds.

Dr. Marcet's inquiries incline him to think, that on the whole, lithotomy in the London Hospitals for some years, has been gradually becoming less frequent; and this he conceives may be owing, partly to a real reduction in the frequency of the stone, from some alteration in the diet, or habits of the people; partly to the use of appropriate medicines; and partly to the circumstance of calculous patients not resorting so exclusively, as was formerly the case, to the great London hospitals for the operation.

In the Royal Infirmary at Edinburgh, the average number of stone cases annually, during the last six years, is said not to have exceeded 2, although about 2000 patients are admitted there every year.

Dr. Marcet has been informed by M. Roux, that, in La Charité at Paris, ten or twelve cases of stone occur every year, out of about 2600 patients, and that the proportion of deaths from the operation there is 1 in 5 or 6.

In the Hôpital des Enfans Malades, in the same city, Dr. Marcet states, on the authority of Dr. Biett, that about 6 cases of stone are received every year into that establishment, where about 3000 children of both sexes are annually admitted. There have been only 3 cases in females, and what is remarkable, only two deaths from the operation in the course of the last seven years.

Dr. Marcet was acquainted, that lithotomy is comparatively rare at Vienna, not on account of the want of good surgeons, or the unfrequent occurrence of stone cases in that part of the continent; but in consequence of the little attention paid to this disease by the most eminent surgeons of the Austrian capital.

At Geneva, says Dr. Marcet, in a population of 30,000, lithotomy has been performed only thirteen times in the last twenty years, though good surgeons are never wanting in that town to perform the operation whenever an opportunity presents itself. Out of these thirteen patients, seven were not strictly Genevese, though belonging to the neighbouring districts, and one was an Englishman; so that the disease would, at first sight, appear to be a rare occurrence at Geneva. But, continues Dr. Marcet, *if the smallness of the Genevese population be taken into account*, this proportion of calculous cases may not fall very short of that observed in other places. At Lyons, a populous town, not more than eighty miles distant from Geneva, the disease is stated to be rather frequent.

With regard to the chymical nature of urinary calculi, there was nothing known until 1776, when Scheele published on the subject in the Stockholm Transactions. He there stated, that all the urinary calculi, which he had examined, consisted of a peculiar concrete substance, now well known by the name of *lithic*, or *uric* acid, which he also showed was soluble in alkaline lixivia. Scheele further discovered, that the lithic matter was, in some degree, capable of being dissolved in cold water; that this solution possessed acid properties, and, in particular, that of reddening litmus; that it was acted upon in a peculiar manner when boiled in nitric acid; and lastly, that human urine always contained this substance in greater or less quantity, and often let it separate in the form of a brick-coloured sediment, by the mere effect of cooling.

The discovery made by Scheele was confirmed by Bergmann and Morveau, and the investigation of the subject was afterward prosecuted by others with redoubled ardour. As Professor Murray observes, experiments continued to be repeated and diversified on these concretions, and on their solvents. At length it was fully ascertained, that there existed others, besides those composed of uric acid; and, latterly, our knowledge of them has been much extended by the researches of Pearson, Wollaston, Fourcroy, and Vauquelin. Several important facts have also been established by the talents and industry of some other distinguished men; viz. Dr. Henry, of Manchester; Professor Brande, of the Royal Institution of London; Dr. Marcet, late of Guy's Hospital; and Dr. Prout, of London. The facts and considerations of the latter writer render it probable, however, that the common opinion of pure lithic acid being contained in the urine is not exactly correct; but that this acid "in healthy urine exists in a state of combination with ammonia, and that, in reality, this fluid contains no uncombined acid at all." (*On the Nature, &c. of Gravel and Calculus, c.* 13.)

The credit which is due to Dr. Wollaston for his valuable and original discoveries, respecting urinary calculi, is very considerable; a truth which I have particular pleasure in recording here, since his merits have not been fairly appreciated by the French chymists. Indeed, as Dr. Marcet observes, it is the more desirable that his claims should be placed in the clearest point of view, as the late celebrated M. Fourcroy, both in his "Système des Connoissances Chimiques," and in his various papers on this particular subject, has, in a most unaccountable manner, overlooked Dr. Wollaston's labours, and, in describing results, exactly similar to those previously obtained and published by the English chymist, has claimed them as his own discoveries. Yet Dr. Wollaston's was printed in our Philosophical Transactions, two years before Fourcroy published his Memoir in the "Annales de Chimie," and three years before he gave to the world his "Système des Connoissances Chimiques;" and he discussed in these works a paper of Dr. Pearson on the lithic acid, published in a volume of the Philosophical Transactions (for 1798) subsequent to that which contained the account of Dr. Wollaston's discoveries! (See *Marcet's Essay on Calculous Disorders, p.* 60. Also *Murray's Syst. of Chym. vol.* 4, *p.* 636, *edit. of* 1809.)

It would appear then, that Scheele first discovered the nature of those urinary calculi which consist of lithic acid; but that Dr. Wollaston first ascertained the nature of several other kinds, some of which have also been described at a later period by Fourcroy and Vauquelin. On the whole, there are five species of concretions, whose chymical properties were first pointed out by Dr. Wallaston, and no less than four belong to the urinary organs. These are, 1st. Gouty concretions. 2dly. The fusible calculus. 3dly. The mulberry calculus. 4thly. The calculus of the prostate gland. 5thly. The cystic oxide, discovered in 1810.

1. *Lithic Acid Calculus.* Dr. Prout believes that, at least two-thirds of the whole number of calculi originate from lithic acid; for, as it forms by far the most common nucleus, round which other calculous matter is subsequently deposited, if such nuclei had not been formed and detained, two persons at least out of three who suffer from stone, would never have been troubled with the disorder. (*On Gravel, Calculus, &c. p.* 95.)

Lithic Acid forms a hard, inodorous concretion, of a yellowish, or brown colour, similar to that of wood of various shades. According to Professor Murray, calculi of this kind are in fine, close layers, fibrous, or radiated, and generally smooth on their surface, though sometimes a little rough. They are rather brittle, and have a specific gravity, varying from 1,276 to 1,786, but usually above 1,500. One part of lithic acid is said to dissolve in 1720 parts of cold water, and 1150 parts of boiling water; (*Marcet, p.* 65.) and this solution turns vegetable blues to a red colour. When it has been dissolved in boiling water, small yellowish crystals are deposited as the fluid becomes cold. Lithic acid calculi blacken, but are not melted by the blowpipe, emitting a peculiar animal smell, and gradually evaporating, until a small quantity of white ash remains, which is alkaline. By distillation, they yield ammonia and prussic acid. They are soluble in the cold, in a solution of pure potassa, or soda, and from the solution a precipitate of a fine white powder is thrown down by the acid. Lime-water likewise dissolves them, but more sparingly. According to Scheele they remain unchanged in solutions of the alkaline carbonates; a statement which agrees with that of Dr. Prout, who accounts for the effect said to be produced by the alkaline carbonates upon calculi in the bladder, by their property of dissolving the lithate of ammonia. (*Egan in Trans. of Irish Acad.* 1805, *Prout on Gravel, &c. p.* 84.) They are not much acted upon by ammonia. They are not soluble either in the muriatic or sulphuric acid; though they are so in the nitric when assisted by heat, and the residue of this solution, when evaporated to dryness, assumes a remarkably bright pink colour, which disappears on adding either an acid or an alkali. In many of these calculi, the lithic acid is nearly pure; in others, there is an intermixture of other ingredients, particularly of phosphate of lime, and phosphate of ammonia and magnesia; and, in almost all of them, there is a portion of animal matter, which occasions the smell when they are burnt, and the loss in their analysis. (See *Murray's Chymistry, vol.* 4, *p.* 640; *and Marcet's Essay on the Chym. and Med. Hist. of Calculous Disorders,* 8vo. *Lond.* 1817.)

A great quantity of uric acid is formed in gouty constitutions, and deposited in the joints, or soft parts, in the state of lithate of ammonia. Sir Everard Home removed a tumour weighing four ounces from the heel of a gentleman, a martyr to the gout; and when analysed by Professor Brande, it was found to be principally composed of uric acid. (*On Strictures, vol.* 3, *p.* 313.)

2. *Lithate of Ammonia Calculus,* according to Dr. Prout, is generally of the colour of clay. Its surface is sometimes smooth; sometimes tuberculated. It is composed of concentric layers, and its fracture resembles that of compact limestone. It is generally of small size, and rather uncommon; but the lithate of ammonia very frequently occurs, mixed with lithic acid, forming a mixed variety of calculus. Under the flame of the blowpipe it usually decrepitates strongly. It is much more soluble in water than the lithic acid calculus; and always gives off a strong smell of ammonia on being heated with caustic potash. *The lithate of ammonia is also readily soluble in the alkaline subcarbonates, which pure lithic acid is not.* (*Prout on Gravel, &c. p.* 83.)

3. *Bone Earth, Phosphate of Lime Calculus.* The presence of phosphate of lime in urinary calculi had been mentioned by Bergmann and others, when Dr. Wollaston first ascertained, that some calculi are entirely composed of it. From the investigations of Dr. Wollaston, it appears that this substance sometimes, though rarely, composes the entire calculus, but that in general it is mixed with other ingredients, particularly with uric acid, and phosphate of magnesia and ammonia. In the first case, the calculus is described as being of a pale brown colour, and so smooth as to appear polished. When sawn through, it is found very regularly laminated, and the laminæ in general, adhere so slightly to each other, as to separate with ease into concentric crusts. It dissolves entirely, though slowly, in muriatic or nitric acid. Exposed to the flame of the blowpipe, it is at first slightly charred, but soon becomes perfectly white, retaining its form, until urged with the utmost heat from a common blowpipe, when it may be completely fused. It appears to be more fusible than the phosphate of lime, which forms the basis of bone; a circumstance which Dr. Wollaston ascribes to the latter containing a larger quantity of lime. (*Phil. Trans.* 1797.)

4. *Triple Phosphate of Magnesia and Ammonia Calculus.* The existence of this calculus in the intestines of animals was first pointed out by Fourcroy; but its being a constituent part of some urinary calculi of the human subject, was originally discovered by Dr. Wollaston. (*Phil. Trans.* 1797.) According to Dr. Prout, this species of calculus is always nearly white: its surface is commonly uneven, and covered with minute shining crystals. Its texture is not laminated, and it is easily broken and reduced to powder. In some rare instances, however, it is hard and compact, and when broken, exhibits a crystalline texture, and is more or less transparent. Calculi composed entirely of the phosphate of magnesia and ammo-

nia are rare, but specimens, in which they constitute the predominant ingredient are by no means uncommon. (*Prout*, *p.* 86.) When the blow-pipe is applied, an ammoniacal smell is perceived, the fragment diminishes in size, and if the heat be strongly urged, it ultimately undergoes an imperfect fusion, being reduced to the state of phosphate of magnesia. (*P.* 69.) Dr. Wollaston describes the form of the crystals of this salt, as being a short trilateral prism, having one angle a right angle, and the other two equal, terminated by a pyramid of three or six sides. These crystals, as Dr. Marcet has explained, are but very sparingly soluble in water, but very readily in most, if not all the acids, and on precipitation, they reassume the crystalline form. From the solutions of these crystals in muriatic acid, sal ammoniac may be obtained by sublimation. Solutions of caustic alkalies disengage ammonia from the triple salt, the alkali combining with a portion of the phosphoric acid.

5. *Fusible Calculus.* Mr. Tennant first discovered, that this substance was different from the lithic acid, and that, when urged by the blowpipe, instead of being nearly consumed, a large part of it melted into a white vitreous globule. The nature of the fusible calculus was afterward more fully investigated and explained by Dr. Wollaston. (*Phil. Trans.* 1797.) According to the excellent description lately given of this calculus by Dr. Marcet, it is commonly whiter and more friable than any other species. It sometimes resembles a mass of chalk, leaving a white dust on the fingers, and separates easily into layers, or laminæ, the interstices of which are often studded with sparkling crystals of the triple phosphate. At other times it appears in the form of a spongy and very friable whitish mass, in which the laminated structure is not obvious. Calculi of this kind often acquire a very large size, and they are apt to mould themselves in the contracted cavity of the bladder, assuming a peculiarity of form which Dr. Marcet has never observed in any of the other species of calculi, and which consists in the stone terminating, at its broader end, in a kind of peduncle, corresponding to the neck of the bladder. The chymical composition of the fusible calculus is a mixture of the triple phosphate of magnesia and ammonia, and of the phosphate of lime. These two salts, which, when separate, are infusible, or nearly so, when mixed together and urged by the blowpipe, easily run into a vitreous globule. The composition of this substance, says Dr. Marcet, may be shown in various ways. Thus, if it be pulverized, and acetic acid poured upon it, the triple crystals will be readily dissolved, while the phosphate of lime will scarcely be acted upon; after which the muriatic acid will readily dissolve the latter phosphate, leaving a small residue, consisting of lithic acid, a portion of which is always found mixed with the fusible calculus.

It is also remarked by Dr. Marcet, that many of the calculi, which form round extraneous bodies in the bladder, are of the fusible kind. And the calculous matter sometimes deposited between the prepuce and glans is found to be of the same nature.

6. *Mulberry Calculus, or Oxalate of Lime* is mostly of a dark brown colour, its interior being often gray. Its surface is usually uneven, presenting tubercles more or less prominent, frequently rounded, sometimes pointed, and either rough or polished. It is very hard, difficult to saw, and appears to consist of successive unequal layers: excepting the few stones, which contain a proportion of silica, it is the heaviest of the urinary concretions. Though this calculus has been named *mulberry* from its resemblance to that fruit, yet, as Dr. Marcet has observed, there are many concretions of this class, which, far from having the mulberry appearance, are remarkably smooth and pale-coloured, as may be seen in plate 8, fig. 6, of that gentleman's essay. According to Mr. Brande, persons who have voided this species of calculus, are much less liable to a return of the complaint, than other patients, who discharge lithic calculi. (*Phil. Trans.* 1808.)

With regard to chymical characters (says Professor Murray,) it is less affected by the application of the usual reagents, than any other calculus. The pure alkaline solutions have no effect upon it, and the acids dissolve it with great difficulty. When it is reduced however to fine powder, both muriatic and nitric acid dissolve it slowly. The solutions of the alkaline carbonates decompose it, as Fourcroy and Vauquelin have observed; and this affords us the easiest method of analysing it. The calculus in powder being digested in the solution, carbonate of lime is soon formed, which remains insoluble, and is easily distinguished by the effervescence produced by the addition of weak acetic acid, while there is obtained in solution the compound of oxalic acid with the alkali of the alkaline carbonate. From this the oxalic acid may be precipitated by the acetate of lead, or of barytes; and this oxalate, thus formed, may be afterward decomposed by sulphuric acid. Another method of analysing this calculus is by exposure to heat: its acid is decomposed, and by raising the heat sufficiently, pure lime is obtained, amounting to about a third of the weight of the calculus. According to Fourcroy and Vauquelin, the oxalate of lime calculus contains more animal matter, than any other. This animal matter appeared to them to be a mixture of albumen and urée. The composition of a calculus of this species analysed by Mr. Brande, was; oxalate of lime 65 grains; uric acid 16 grains; phosphate of lime 15 grains; animal matter four grains.

7. *The Cystic Oxide Calculus* is small, and very rare. It was first described by Dr. Wollaston. (*Phil. Trans. for* 1810.) In external appearance, it bears a greater resemblance to the triple phosphate of mag-

nesia, than any other sort of calculus. However, it is more compact, and does not consist of distinct laminæ, but appears as one mass confusedly crystallized throughout its substance. It has a yellowish semi-transparency, and a peculiar glistening lustre. Under the blowpipe, it gives a singularly fetid smell, quite different from that of lithic acid, or the smell of prussic acid. In consequence of the readiness, with which this species of calculus unites both with acids and alkalies, in common with other oxides, and the fact of its also containing oxygen (as is proved by the formation of carbonic acid by distillation,) Dr. Wollaston named it an oxide, and the term *cystic* was added from its having been originally found only in the bladder in two examples. Dr. Marcet, however, has subsequently met with no less than three instances of calculi formed of cystic oxide, all of which were unquestionably of *renal* origin.

8. *Alternating Calculus.* Lithic strata frequently alternate with layers of oxalate of lime, or with the phosphates. Sometimes also the mulberry alternates with the phosphates, and in a few instances, three, or even four species of calculi occur in the same stone, disposed in distinct concentric laminæ. On the comparative frequency of these and other varieties of calculi, Dr. Prout's work contains valuable information.

9. *Compound Calculi, with their Ingredients intimately mixed.* Under this title Dr. Marcet comprehends certain calculi, which have no characteristic feature, by which they can be considered as distinctly belonging to any of the other classes. He observes, that they may sometimes be recognized by their more or less irregular figure, and their less determinate colour; by their being less distinctly, if at all divisible into strata; and by their often possessing a considerable hardness. By chymical analysis confused results are obtained. (See *Essay on the Chym. and Med. Hist. of Calculous Disorders, p.* 90.)

10. *Calculi of the Prostate Gland.* The composition of those calculi is said to have been first explained by Dr. Wollaston. (See *Phil. Trans. for* 1797.) They all consist of phosphate of lime, the earth not being redundant as in bones. Their size varies from that of a pin's head to that of a hazel nut. Their form is more or less spheroidal; and they are of a yellowish brown colour.

Fourcroy has described a species of urinary calculus, which is characterized by its being composed of the urate or lithate of ammonia. Dr. Wollaston, Mr. Brande, and Dr. Marcet did not, however, satisfactorily ascertain the presence of this substance in any of the concretions, which they examined. As also urea and the triple phosphate, both of which afford ammonia, are frequently present in lithic calculi, it is conjectured, that these circumstances may have given rise to the analytical results, from which the existence of urate of ammonia has been inferred. (*Brande in Phil. Trans.* 1808. *Marcet's Essay, p.* 93.)

The recent investigations of Dr. Prout, however, tend to establish the reality of the lithate of ammonia calculus.

Dr. Marcet has met with two specimens of urinary calculi entirely different from any which have hitherto been noticed. One of these he proposes to name *Xanthic oxide,* from ξανθος, *yellow,* because one of its most characteristic properties is that of forming a lemon-coloured compound, when acted upon by nitric acid. The chymical properties of the other new calculus, mentioned by Dr. Marcet, correspond to those of fibrine, and he therefore suggests the propriety of distinguishing it by the term *fibrinous.* For a particular description of these new substances, I must refer to this gentleman's Essay.

11. *Carbonate of Lime Calculus.* This substance is not enumerated by Dr. Marcet, as entering into the composition of urinary calculi. But, according to Mr. R. Smith, there can be no doubt of the fact. Dr. W. H. Gilby of Clifton, he says, detected it decidedly in four instances. "A notice of it will be found in Mr. Tillock's Journ. for 1817, vol. 49, p. 188, in the account of a curious calculus, given to me by Mr. G. M. Burroughs, of Clifton; the nucleus of which is a common cinder, an inch and a half long, and one broad. Since the publication of that paper (continues Mr. Smith,) Mr. H. Sully, of Wiveliscombe, sent me three oddly shaped calculi, which he removed from a lad, together with 15 pea-sized ones previously voided by the urethra, which are entirely carbonate of lime, held together by animal mucus." (See *Med. Chir. Trans. vol.* 11, *p.* 14.) Dr. Prout has also seen some small calculi, composed almost entirely of carbonate of lime. (*On Gravel, &c. p.* 89.)

Dr. Prout has investigated with considerable talent the comparative prevalency of the different forms of urinary deposite, and the order of their succession. His data are taken from the examinations, made by Professor Brande, of the calculi in the Hunterian Collection; by Dr. Marcet, of those at Norwich and Guy's Hospital; by Dr. Henry, of those at Manchester; and by Mr. Smith, of others preserved at the Bristol Infirmary. The whole number of calculi examined was 823; of these, 294 were classed under the name of lithic acid, 98 of which were nearly pure; 151 were mixed with a little of the oxalate of lime; and 45 with a little of the phosphates. 113 consisted of oxalate of lime. Three were of cystic oxide. 202 were phosphates; of which 16 were nearly pure; 84 mixed with a small proportion of lithic acid; eight consisted of phosphate of lime nearly pure; three of triple phosphate nearly pure; and 91 of the fusible or mixed calculi. 186 were alternating calculi, or those whose laminæ varied, but consisted of lithic acid, oxalate of lime, and phosphates: of these, 15 consisted of lithic acid and oxalate of lime, the first being in the greatest proportion; 40 of the oxalate of lime in the greatest proportion, and lithic acid in the least; 51 of the lithic acid and the phosphates; 49 of the oxalate of lime, and the phosphates; 12 of the oxalate of lime, lithic acid, and the phosphates; one of fusible and lithic; two of fusible, and oxalate of lime; and 16, the composition of which was not mentioned.

Of compound calculi, whose composition was not specified, there were 25. (See *W. Prout's Inquiry into the Nature and Treatment of Gravel and Calculus, p.* 94.)

The proportion of *lithic acid calculi* is somewhat more than one-third of the whole number. But as this acid is the common nucleus, round which other calculous matter is deposited, Dr. Prout computes the proportion of calculi originating from it, to be at least two-thirds of the whole number. According to the experiments of the same physician, the red crystalline calculus is composed of nearly pure lithic acid; and the earthy, amorphous one, consists of lithic acid, more or less ammonia, generally a little of the phosphates, and sometimes a small portion of the oxalate of lime. The lighter the colour, the greater in general the proportion of lithate of ammonia and the phosphates. (*P.* 97.)

Oxalate of lime calculi form one-seventh of the whole number, without any regularity, however, in different museums.

Cystic oxide calculi are so rare, that the proportion found was only one in 274.

Calculi composed of the phosphates, made about one-fourth of the whole number.

Alternating Calculi amounted to between one-fourth and one-fifth; but, Dr. Prout offers good reasons for believing, that the data, from which the estimate is drawn, cannot be depended upon. For additional information on this branch of the subject, I must refer to Dr. Prout's valuable work.

The stone being a severe affliction, and the operation extremely hazardous and painful, a variety of experiments have been instituted for the purpose of discovering a solvent for urinary calculi. Hitherto, however, all the remedies and plans which have been tried, have been attended with very limited, and by no means, unequivocal success, notwithstanding many persons may have been deceived into a contrary opinion.

The dissolution of stones in the bladder has been attempted by *lithontriptic medicines,* as they are termed, and by fluids injected into this viscus. At the present day, practitioners direct their endeavours very much to the correction of those particular diatheses, or states of the constitution, on which the formation of various calculi depend, and more confidence seems to be placed in this aim, than in any schemes for the dissolution of urinary concretions. It is certain, that in the latter project many difficulties present themselves, and among these, some of the most serious are the great variety in the composition of calculi; the impossibility of knowing the exact ingredients of a stone, while it is concealed in the bladder, though many useful suggestions for assisting the judgment on this point have been recently offered by Dr. Prout; and lastly, if the right solvent were ascertained, as calculated upon chymical principles applied to urinary concretions out of the body, it is obvious, that any medicines, taken by the mouth, are liable to so many changes in the alimentary canal, and in the lymphatic and vascular systems, that it must be exceedingly difficult to get them in an unaltered state and effective quantity into the bladder; while, if this were possible (as it is in the way of injection through a catheter,) the bladder itself might be incapable of bearing the application, and the patient lose his life in the experiment.

As Dr. Prout well observes, a calculus in the bladder may be considered a substance placed in a solution of various principles in a certain quantity of water. If any of the more insoluble of these principles exist in this solution in a state of supersaturation, the calculus will afford a nucleus, round which the excess will be deposited. But, if none exist in a state of excess, of course none can be deposited, and the calculus will not increase in bulk.

Whoever studies the chymical properties of the urine, says Dr. Marcet, will learn, that "if any alkali (a few drops of ammonia for instance,) be added to recent urine, a white cloud appears, and a sediment, consisting of phosphate of lime, with some ammoniaco-magnesian phosphate, subsides in the proportion of about two grains of the precipitate from four ounces of urine. Lime water produces a precipitate of a similar kind, which is still more copious; for the lime, in combining with the excess of phosphoric, and perhaps also of lactic acid, not only precipitates the phosphate of lime, which these acids held in solution, but it decomposes the other phosphates, thus generating an additional quantity of the phosphate of lime, which is also deposited.

"If, on the contrary (observes the same author,) a small quantity of any acid, either the phosphoric, the muriatic, or indeed even common vinegar, be added to recent healthy urine, and the mixture be allowed to stand for one or two days, small reddish crystalline particles of lithic acid will be gradually deposited on the inner surface of the vessel.

"It is on these two general facts that our principles of chymical treatment ultimately rest. Whenever the lithic secretion predominates, the alkalies are the appropriate remedies; and the acids, particularly the muriatic, are the agents to be resorted to when the calcareous or magnesian salts prevail in the deposite." (*P.* 147, 148.)

The alkalies taken into the stomach certainly reach the urinary passages through the medium of the circulation; and it is also strongly suspected that the acids likewise do so, though this circumstance is still a question. Unfortunately, the quantity of either alkalies or acids, which thus mixes with the urine, is so small, that no impression is made upon calculi of magnitude. The experience of Dr. Marcet, Dr. Prout, and others, however, has clearly ascertained that such medicines are often capable of checking a tendency to the formation of stone, and sometimes of bringing on a calculous deposite depending upon the altered state of the system. Indeed Dr. Marcet expresses his decided opinion, that, even supposing not an atom of alkali or acid ever reached the bladder, still it would not be unreasonable to expect that these remedies may respectively produce the desired changes during the first stages of assimilation; in one case, by neutralizing any morbid excess of acid in the primæ viæ; and in the other, by checking a tendency to alkalescence, or otherwise disturbing those affinities, which, in the subsequent processes of assimilation and secretion, give rise to calculous affections. (*P.* 153.)

When muriatic acid is prescribed, from 6 to 25 drops may be given two or three times a day, diluted with a sufficient quantity of water.

The best way of taking the alkalies is by drinking soda water as a common beverage. It is asserted, however, on the authority of Sir G. Blane, that when the alkalies are combined with nitric acid, as in the ordinary saline draught, they also have the effect of depriving the urine of its acid properties.

Dr. Marcet, with every appearance of probability, refers to carbonic acid itself no solvent power; and he does not even adopt Mr. Brande's opinion, that this acid passes into the urine, when patients drink fluids impregnated with it.

But, it may be inquired, if no known internal medicine will dissolve a stone already formed, what is the good of merely altering the diathesis, and checking the increase of the calculus, as lithotomy must still be necessary? The reasons for persevering in the aim of correcting any particular state of the system, and the urinary secretion, on which state the increase of a calculus depends, are very important; for it is found, that, though medicines may be quite incapable of dissolving a calculus, they relieve a great deal of the distress and suffering apparently the effect of the diathesis itself, as will be presently noticed, and sometimes afford such ease that the operation may be postponed until the health is improved, or, in a very old subject, even be dispensed with altogether. The aim is also of high importance, with the view of preventing relapses.

As the lithic acid diathesis seems to be concerned in the production of about two-thirds of the whole number of the urinary calculi, the correction of it has been a chief aim among modern practitioners. For this purpose, Magendie, whose experiments tend to prove that the lithic acid diathesis may be lessened and removed by abstinence from animal food, and other nutriments abounding in azote, founds his practice very much upon this alleged fact. His indications, however, are four in number, viz. 1. to lessen the quantity of uric acid produced by the kidneys; 2. to augment the secretion of urine; a maxim, which leads him to consider cutaneous perspiration injurious; a statement which I think must be rejected, considering the rarity of calculi in hot climates, independently of the sentiments of Dr. Wilson Philip, that the precipitating acid (if such be the cause) is thrown off by the skin, and consequently that insuring a due performance of the cutaneous functions, must, in these cases, be beneficial. (See *Medical Trans. of the College of Physicians, Vol.* 6.) 3. To prevent the lithic acid from assuming a solid form, by saturating it. 4. When gravel and calculi are formed, to promote their discharge and attempt their dissolution. (*Récherches, &c. sur la Gravelle, p.* 42.)

For correcting the lithic acid diathesis, Dr. Prout particularly enjoins the avoidance of errors in diet, exercise, &c. The error of quantity of food, he deems worse than the error of quality. Patients, he says, should abstain altogether from things which manifestly disagree with them, and which must be unwholesome to all, such as heavy unfermented bread, hard boiled and fat puddings, salted and dried meats, acescent fruits, and (if the digestive organs be debilitated) soups of every kind. In general also wine, and particularly those of an acescent quality, should be avoided. The wearing of flannel, the preserving a regular state of the bowels, and the occasional use of alterative medicines, are likewise commended. (*Prout on Gravel, &c. p.* 135.)

According to the same author, the treatment of calculous affections is either of a local or general description. The local treatment is nearly the same in all the species; the general treatment will depend upon the nature of the calculous diathesis.

What Dr. Prout calls the local treatment consists chiefly in prescribing hyosciamus and opium, either alone or combined with uva ursi. The hyosciamus, he says, is generally preferable in the lithic acid diathesis, and opium in the phosphatic. He also recommends the use of opium in the form of injection and embrocation, and especially in that of a suppository. The warm bath, fomentations, and sitting over hot water, are spoken of as other means of relief.

According to the observations of the same well-informed writer, the distressing symptoms produced by lithic acid calculi have a very constant relation to the severity of the diathesis present; a circumstance, which he says is also more or less true with respect to all the other kinds of calculi: that is to say, in proportion as the urine is unnatural, and loaded with gravel and amorphous sediments, in the same proportion are the patient's sufferings. Hence our first object should be to restore the urine to its natural state. The first means to be recommended, in ordinary cases, is usually a dose of calomel and antimonial powder, the Plummer's pill, or some other alterative purgative, taken at night, to be followed up the next morning by an alkaline diuretic purgative, composed, for example, of Rochelle salts and magnesia, or subcarbonate of soda. During the day, a strong infusion of uva ursi, combined with hyosciamus and the liquor potassæ, may be taken. These means are to be persisted in for a greater or less time, according to the circumstances, and till the urine begins to be natural: they may then be gradually left off or varied, as occasion may require; and, under this plan, it will be found, that, in the majority of cases, *not only the urine will assume its natural state, but most, or all the distressing symptoms of calculus in the bladder, will be very much diminished, and in many instances disappear.* It is obvious also that, while the urine is in its natural state, the calculus cannot increase in size.

"After the diathesis is once fairly broken by these means, it may in general be easily prevented from recurring by attention to the diet, and other circumstances, formerly mentioned as inducing this diathesis, and by the occasional use of medicines; and the patient will scarcely know that he has a calculus in the bladder, at least from the pain that it gives him. I state this with confidence; but at the same time, I wish to be understood to mean, that the freedom from pain, &c. depend, in no inconsiderable degree, upon the size of the calculus, its smoothness, upon the exercise a patient is obliged to take, &c. all of which are presumed to be favourable; for it must be sufficiently obvious that a foreign substance in the bladder cannot be prevented from acting *mechanically*, and from occasionally producing bloody urine, or a temporary stoppage of the discharge of that secretion from the bladder, and similar symptoms, if the patient is obliged to take severe exercise." (*Prout on Gravel, &c. p.* 202—204.)

At the beginning of the eighteenth century, lime and the alkalies were known to be frequently productive of relief in cases of stone, and in particular the nostrum of a Mrs. Steevens, the active ingredients of which were calcined egg-shells and soap, acquired such celebrity for the cures which it effected, that much anxiety was expressed that her formula should be made public. The consequence was, that, in the year 1739, parliament appointed a committee of 22 respectable men to investigate the merits of the remedy in question; and, on their very favourable report, the secret was purchased for the sum of 5000*l*. These proceedings naturally interested our neighbours, and in the year 1740 and 1741, Morand communicated to the Academy of Sciences two memoirs, in which are reported numerous cases where the new remedy was tried, and mostly with success; the greater number of the patients being described as either benefited or actually cured.

In many instances, stones which had been unquestionably felt, were no longer to be discovered; and as the *same* persons were examined by surgeons of the greatest skill and eminence, both before and after the exhibition of the medicines, it is no wonder that the conclusion was drawn that the stones had been really dissolved. From the cessation of this success, however, and from its now being known that stones occasionally become lodged in a kind of cyst, on the outside of the general cavity of the bladder, so as to cause no longer any material suffering, surgeons of the present day are inclined to suspect, that this must have happened in Mrs. Stevens's cases. This was certainly what happened to one of the persons, on whom the above medicine was tried, as Dr. W. Hunter informs us. It is evident, that a stone, so situated, would not in general produce a great deal of irritation, nor admit of being felt with a sound; though, as I have stated in the article *Lithotomy*, there have been a few exceptions to this observation.

Mrs. Steevens first gave calcined egg-shells alone; but, finding costiveness produced, she added soap. In time, she rendered her process more complicated, adding snails burnt to blackness, a decoction of camomile flowers, parsley, sweet fennel, and the greater burdock.

That, in the lithic acid diathesis, the carbonated fixed alkalies, taken in large doses, have the effect of passing into the urine, and saturating the redundant lithic acid in the unhealthy state of that fluid, is a fact decidedly proved. If there were any doubt yet remaining upon this point, it would be immediately removed by the perusal of the case of the celebrated Mascagni as detailed by himself. (See *Mem. della Soc. Ital.* 1804.) This eminent anatomist being much afflicted with gravel, derived benefit from drinking the *aqua alcalina mephitica*, or Selzer Water; but, conceiving, that more good might result from a trial of carbonate of potash, he took at first half a dram of this substance in the morning, and as much in the evening, dissolved in ten ounces of water. The second day, the dose was augmented to two drams, and on the third to three, which quantity dissolved in 20 ounces of water, was continued for ten days. "Before taking the carbonate of potash (says Mascagni) my urine was very acid, and immediately reddened litmus paper: as soon as the medicine was begun, I made the same experiment with the urine, then voided, and found the intensity of the colour of the paper less. *The second day, the paper was very little altered, and on the third, the urine did not redden it at all.* The acid in my urine, therefore, was saturated, and, at the same time, the pain in my loins diminished, and no more gravel was voided with my urine. Afterward the pain ceased entirely, the urine became clearer, and I perceived that it contained an excess of potash." Being attacked again at a subsequent period with the gravel, Mascagni adopted the same treatment, and experienced equal benefit from it.

In the lithic acid diathesis, the caustic alkali, in the form of the liquor potassæ, has sometimes been thought to have more efficacy, than the carbonate.

Sir E. Home and Mr. Hatchet first suggested the utility of giving magnesia in cases of stone; and the proposal was communicated to the public by Mr. Brande (*Phil. Trans.* 1810.) As Dr. Marcet observes, magnesia is often found advantageous in long-protracted cases, in which the constant use of the subcarbonated, or caustic alkalies, would injure the stomach. But, he properly remarks, that, if magnesia is sometimes beneficial, it has of late years often done harm. For, as this earth is the base of one of the most common species of calculi, viz. that containing the phosphate of ammonia and magnesia, there is nearly an even chance, when magnesia is prescribed, without any previous knowledge of the nature of the calculus, that it will prove injurious. Magnesia, also, when long and profusely administered, sometimes forms large masses in the intestinal canal, causing serious distress, and even fatal consequences.

According to Dr. Prout, purgatives will sometimes stop calculous depositions, especially in children; and Dr. Henry, of Manchester, has observed that a quack medicine, composed of turpentine and opium, will occasionally produce a plentiful discharge of lithic acid from the bladder.

On the whole, I believe, reason and experience will allow us to consider limewater, soap, acidulous soda water, the carbonate of potassa, the liquor potassæ, and magnesia, only as palliative remedies, by which the pain of the disorder may sometimes be diminished, and the urinary secretion improved, it being more rational to impute the few supposed instances of greater success to the calculi becoming encysted.

As medicines, taken into the stomach, will not dissolve urinary calculi, solvent injections have been introduced through a catheter directly into the bladder. Fourcroy and Vauquelin ascertained, that a ley of potassa, or soda, not too strong to be swallowed, softens and dissolves small calculi, composed of the uric acid and urate of ammonia, when they are left in the liquid a few days. They proved, that a beverage, merely acidulated with nitric or muriatic acid, dissolves with still greater quickness, calculi, formed of the phosphate of lime, and of the triple phosphate of ammonia and magnesia. They also ascertained, that calculi, composed of the oxalate of lime, which are the most difficult of solution, may be softened, and almost quite dissolved, in nitric acid, greatly diluted, provided they are kept in the mixture a sufficient time.

Liquids are then known which will dissolve calculi of various compositions; but, as I have already hinted, much difficulty occurs in employing them effectually in practice. For, although they can be easily injected into the bladder, this organ is so extremely tender and irritable, that the action of such liquids upon it, as would be requisite for dissolving a stone, would produce sufferings which no man could endure, and the most dangerous and fatal effects on the bladder itself. Another objection to this practice also arises from the surgeon never knowing what the exact composition of a calculus is, before this body is extracted, and his consequent inability to determine what solvent ought to be tried.

Until the complete success of lithontriptics is established, therefore, the operation of lithotomy, severe and hazardous as it is, must continue an indispensable practice, whenever the patient's sufferings are great, and the calculus too large to be voided, or extracted through the urethra. In the early stage, however, before calculi have exceeded a certain size, if they cannot be expelled with the urine, they may sometimes be taken out by means of an instrument, invented by Mr. Weiss, of the Strand, shaped like a sound, but the end of which, after its introduction into the bladder, admits of being opened and made to grasp the calculus, which is then to be drawn through the urethra. The urine is first to be discharged through a catheter. (See *an Account of a Case, in which numerous Calculi were extracted without cutting Instruments, by Sir. A. Cooper, in Med. Chir. Trans. Vol.* 11, *p.* 349.)

Consult *T. Lobb, a Treatise on Dissolvents of the Stone, 8vo. Lond.* 1739. *Stephen Hales, Experiments and Observations on Mrs. Steevens's Medicines, 8vo. Lond.* 1741. *Morand, in Mem. de l'Acad. des Sciences,* 1740, *and* 1741. *J. Rutty, New Experiments on Joanna Steevens's, Medicines, 8vo. Lond* 1742 *R. Whyit, an Essay on the Virtues of Lime Water and Soap, in the Cure of Stone, 8vo. Edinb.* 1761. *D. Hartley, a View of the present Evidence for and against Mrs. Steevens's Medicine, 8vo. Lond.* 1739; *and Supplement,* 1740. *N. Hulme, a safe and easy Remedy for the Stone, &c. 4to. Lond.* 1778 *Wm. Butler, Method of Cure for the Stone, chiefly by injections, 12mo. Edinb.* 1754. *B. Langrish, Physical Experiments upon Brutes, in order to discover a safe Method of dissolving Stones in the Bladder by Injections, 8vo. Lond.* 1746. *J. Jurin, Effects of Soap-ley, taken internally for the Stone, 2d Edit. with an Appendix, 12mo. Lond.* 1745. *J. F. Schreiber, De Medicamento, à J. Steevens, contra calculum divulgato inefficaci et noxio, Gött.* 1744. *Murray Forbes, a Treatise upon Gravel and Gout, with an Examination of Dr. Austin's Theory of Stone, an Inquiry into the Operation of Solvents, &c. 8vo. Lond.* 1793. *W. Austin, a Treatise on the origin and component Parts of the Stone, &c. 8vo. Lond.* 1791. *T. Beddoes, on the Nature and Cure of Calculus, &c. 8vo. Lond.* 1793. *J. S. Dorsey, an Essay on the Lithontriptic Virtues of the Gastric Liquor, 8vo. Philadelphia,* 1802. *M. Girardi, De Uva Ursina, ejusque et aquæ calcis vi lithontriptica, &c. Patav.* 1764. *Scheele, in Stockholm Trans. Fourcroy, in Systeme des Connoissances Chimiques. Wollaston, Pearson, and Brande, in Phil. Trans. and Journal of Science and Arts, Vols.* 6 *and* 8, *&c. A. Marcet, on the Chymical History and Medical Treatment of Calculous Disorders, 8vo. Lond.* 1817; *a work full of valuable information. Wilson Philip, in Medical Trans. Vol.* 6. *Dr. Henry, in Med. Chir. Trans. Vol.* 10. *C. Scudamore, on Gout, &c. Edit.* 3. *F. Magendie, Recherches Physiologiques et Médicales sur les Causes, &c. de la Gravelle, 8vo. Paris,* 1818. *A.*

Copland Hutchison, on the Comparative Infrequency of Urinary Calculi among Seafaring People, vid. Med. Chir. Trans. Vol. 9. R. Smith, a Statistical Inquiry into the Frequency of Stone in the Bladder, in Great-Britain and Ireland, vid. Med. Chir. Trans. Vol. 11. W. Prout, an Inquiry into the Nature and Treatment of Gravel, Calculus, &c. 8vo. Lond. 1821; *a work abounding in original valuable observations. J. Wilson, on the Structure and Physiology of the Male Urinary and Genital Organs, and the Nature and Treatment of their Diseases, 8vo. Lond.* 1821; *this publication contains an excellent summary of the latest observations on the subject.*

URINARY FISTULÆ. By an urinary fistula, strictly speaking, is implied a deep, narrow ulcer, which leads into some of the urinary passages: but, this name is likewise applied to sinuses, which, without having any communication with these passages, terminate near some point of their course. Thus, in Desault's works, *T.* 3, *p.* 287,) three kinds of fistulæ, in respect to the urinary passages, are noticed. The first sort is called a *blind external fistula*, because it opens only externally; the second *blind internal*, because it has only one opening into the urinary passages; the third, is termed *complete*, being attended both with an internal opening into the urinary organs, and one or more external apertures.

Among the blind external fistulæ, only such as terminate near the canal of the urethra are particularly noticed in Desault's works. All fistulæ of this kind are originally owing to an abscess, that has formed in the vicinity of the urethra; and, in the article *Urinary abscesses*, it has been explained, that these suppurations frequently originate from disease of that canal. Whatever may be the cause of these fistulæ, however, it is not unusual to find, that, after the pus has made its way towards the scrotum or perineum, and discharged itself outwardly, the ulcer is converted into a sinus, which resists all the efforts of nature to heal it. One of the chief circumstances, tending to evince, that the sinus has no communication with the urethra, is, that no urine has ever escaped through the opening; for, with respect to the judgment formed from the impossibility of making a probe touch a catheter in the passage, it must be exceedingly fallacious, because the winding course of the sinus, or the small size of its communication with the urethra, may prevent the instruments from touching each other.

According to Desault, the indications in the treatment of these blind fistulæ depend upon the nature of their complications. When the sinuses are kept up by a separation of the scrotum from the parietes of the urethra, Desault recommends exact compression to be made over the part, which method, he says, is sometimes sufficient to accomplish a cure. When this plan fails, he states, that the healing of the sinus may be promoted by practising an incision on one side of the scrotum, and carrying it as far as the denuded portion of the urethra. When sinuses exist, and they depend upon the smallness of the opening, or its unfavourable situation for the discharge of the matter, the aperture should be enlarged, by making an incision into the main collection of pus. When there are callosities, which resist cataplasms, and the most active resolvents, Desault advises us to introduce into the fistula, trochees of minium, for the purpose of destroying the indurated parts. When the bones are diseased, exfoliation must be awaited; and, in every instance, the treatment should vary, according to the cause, upon which the fistula depends.

Blind internal fistulæ, or such as communicate with the urethra, but have no external opening, are sometimes produced in consequence of the bursting of an abscess into this canal; the ulceration, from a retention of urine; a false passage; and the healing of the external part of the wound made in lithotomy, while the internal part is not united.

In these cases, there is a discharge of pus from the urethra, before, and sometimes after, the issue of the urine; and one may feel, in the course of the urethra, a tumour, which increases while the patient is making water, and afterward disappears on pressure, attended with a fresh discharge from the penis of a mixture of pus and urine.

These internal urinary fistulæ cannot be cured, except by preventing the urine from passing into them and lodging there. The catheters employed should be neither too large nor too small. If too large, they would exactly fill the canal, and the pus and urine contained in the fistulæ could not be discharged. If too small, the urine would insinuate itself between them and the sides of the urethra, and enter the fistulæ. Their use must be continued till the ulcer is entirely healed.

The most frequent urinary fistulæ are those which are termed *complete*. Their origin may be in the ureters, bladder, or urethra. Those which arise in the ureters, sometimes terminate in the colon, and the urine is discharged *per anum* mixed with the feces. But most commonly, these fistulæ make their appearance externally, either in the lumbar or inguinal regions. Those which communicate with the bladder, have also different terminations. When they proceed from the upper and interior part of this organ, they ordinarily pierce the parietes of the abdomen above the pubes, and towards the navel. They also sometimes terminate in the groins. When they originate in the posterior parietes of the bladder, they sometimes tend into the cavity of the abdomen, where they almost always prove mortal; and sometimes into the intestines, if there should be adhesions between these and the bladder, so as to favour this communication. When the opening in the bladder is near the bottom of this viscus, the fistula sometimes terminates in the rectum of the male, and the vagina of the female subject; but most frequently it ends in the perineum, in both sexes. With regard to the fistulæ which originate in the urethra, they usually open externally in the perinæum, the scrotum, or the penis, and sometimes also in the rectum. It is not uncommon to see the external opening of these fistulæ at a great distance from the internal one, and to find it in the middle, and even the lower part of the thighs, the groins, parietes of the abdomen, and as high as the sides of the chest. Often there is only one opening in the urethra, while there are several situated externally, more or less distant from one another.

Most of these fistulæ are the consequences of a retention of urine, and are owing to the same causes as the diseases of which they are a symptom. Those which communicate with the rectum, in the male subject, sometimes depend upon this intestine having been wounded in the operation of lithotomy; and those which open into the vagina are often the effect of a violent contusion, caused by the head of the child in difficult labours, or of ulceration produced by pessaries, which are too large, and the margins of which are too sharp and irregular. Carcinoma of the rectum and vagina also give rise to fistulæ, by extending into the bladder.

The discharge of urine from the external orifice of the fistula, is an unequivocal proof of its communication with the urinary passage; when the fistula is narrow, and there is no obstruction in the urethra, the urine sometimes escapes more readily the latter way than through the fistula. It may also be difficult, or even impossible, to find out the internal orifice of the fistula with a probe. When the fistula communicates with the rectum or vagina, a staff introduced through the urethra may sometimes be felt in those parts.

When fistula of the bladder or urethra are the consequences of a retention of urine, produced by strictures, which still exist, or have even increased since the formation of the fistula, the circumstance may render the introduction of the catheter difficult. In this sort of case, if the catheter cannot be passed, the surgeon must endeavour to remove the stricture with bougies, on the principles explained in the article *Urethra, Strictures of.* "In general, (as Sir Everard Home observes,) where fistulæ take place in perinæo, in consequence of a stricture, the removal of the stricture is sufficient to give the fistula a disposition to heal. There are, however, cases which require more being done for that purpose, and simply laying them open is not sufficient." (See *Fistulæ in Perinæo.*) Under such circumstances, Sir Everard Home finds the actual cautery the surest means of making the part heal. In one case, he passed a bougie into the urethra, and seared the edge of the fistula with a hot wire, introduced as far as to touch the bougie. In another instance, a full-sized silver sound was passed into the bladder, and the direction of the fistula having been ascertained with a probe, a female steel sound was heated to redness, and "at the moment at which it passed from a red to a black heat, it was hurried down through the fistula (about two inches and a half) to the sound in the urethra." In both these cases a cure was effected. (*Home on Strictures, Vol.* 3, *p.* 262, *&c.*)

When fistulæ terminate in the lower part of the bladder, Desault advises the utmost care to be taken to prevent the catheter from being stopped up, and to hinder the instrument from becoming displaced, or slipping out of the bladder; for which last purpose, the catheter bracelet described by Sir E. Home seems well calculated. However, when the fistula communicates with the urethra, Desault believes that no advantage would be derived from keeping the catheter open. In both cases, Desault recommends us to continue the catheter, not only until the fistula is cured, but also until the obstacles which hinder the urine from passing the natural way are removed.

Fistulæ of the bladder, communicating with the vagina, and produced by difficult labours, are almost always attended with loss of substance. The forcible contusion, occasioned by the child's head, on the anterior parietes of the vagina and bottom of the bladder, gives rise to the formation of sloughs, the separation of which sometimes leaves apertures large enough to admit the finger, and hence the difficulty of the cure. In treating such fistulæ, there are two indications to be fulfilled: 1st, to hinder the urine from passing into the vagina: 2dly, to keep the edges of the division as closely as possible together, so as to give them an opportunity of uniting.

In women, the introduction of the catheter is easy; but the instrument is more difficult to be fixed than in men. Desault contends, however, that it is very essential to have it so fixed in the bladder that the urine may escape. He found that the only effectual plan was to fasten the catheter to a point that always retained the same position, with respect to the meatus urinarius. He used a kind of machine, made after the manner of a truss, the circle of which was long enough to embrace the upper part of the pelvis, and had in its middle an oval plate, intended to be placed upon the pubes. In the centre of this plate was a groove, to which a piece of silver was fitted, curved so that one of its ends, with an aperture in it, came over the vulva, on a level with the meatus urinarius. This piece of silver admitted of being fastened to the plate with a screw. After the catheter had been introduced and arranged in the bladder, so that its beak and eyes were situated at the lowest part of this viscus, the end of the instrument was put through the aperture of the piece of silver which slided into the groove of the plate, and it was afterward fixed in the way already explained. By means of this machine, the catheter was securely fixed, without incommoding the patient, even when she was walking.

In these last cases, large catheters, with full-sized apertures, should be employed, so that the urine may more readily escape through the instrument, than fall into the vagina. In the early part of the treatment, the catheters should also be left constantly open.

In order to keep the edges of the division as near together as possible, Desault introduced into the vagina a soft kind of pessary, large enough to fill the vagina, without distending it. By this means, the form of the fistula was changed from round to oval, which is the most favourable to its reunion; and the advantage was gained of closing the fistula, and hindering the urine from falling into the vagina.

When the rectum is wounded in lithotomy, Desault advised dividing the parts comprehended between the wound of the operation, the opening in the rectum, and the margin of the anus. That such an operation may become necessary in some instances, I will not say; but it can never be proper until it is seen whether the wound of the rectum will not heal up favourably without such treatment. I have seen two cases, in which the rectum was cut in lithotomy, yet no fistula ensued; and other similar facts have been mentioned to me by professional friends. The success also with which the wound has generally been healed after lithotomy, done through the rectum, is another fact tending to prove, that the inconveniences of a wound of the latter bowel in the operation have been rather exaggerated.

In a case of urinary fistula, communicating with the rectum, and which could not be healed with the catheter, Sir A. Cooper introduced a catheter into the bladder, and his finger into the rectum, and then made an incision, as in the operation for the stone, in the left side of the raphe, until he felt the staff through the bulb. He then directed a double-edged knife across the perineum, between the prostate gland and the rectum, with the intention of dividing the fistulous communication between the urethra and the bowel. A piece of lint was introduced into the wound, and a poultice applied. When the lint was removed, the urine was found to take its course through the opening in perinæo; the aperture in the rectum gradually healed; and that in the perineum quickly closed; the urine being all now discharged in the natural way. (*A. Cooper, Surgical Essays, Part* 1, *p.* 215.)

As the same gentleman has observed, apertures in the urethra, attended with loss of substance, are extremely difficult to heal. He relates a case where the urethra had sloughed at the junction of the scrotum with the penis; the opening healed at its margin, but a large fistulous orifice still remained. Bougies, the plans of excoriating the edges of the opening with blistering plaster, and even paring them off, and bringing the fresh cut surfaces together with the twisted suture, had all been tried in vain. In this example a cure was affected by applying the nitrous acid to the edge of the fistulous orifice, and to the skin, three quarters of an inch around it, the principle on which Sir A. Cooper rested his hopes of success, being the contraction of the skin in cicatrization. The first application having produced considerable amendment, the plan was repeated several times in the course of about nine months, at the end of which time the fistula was closed. But Sir A. Cooper is of opinion, that such practice will only succeed in cases where the skin is very loose, and the scrotum forms a part of the fistulous orifice. If the skin be much confined, he suggests raising a piece of skin from the scrotum, paring off the edges of the fistulous orifice, and removing the skin to a small extent around it. The skin thus raised is to be turned half round, so that its raw surface may be applied to the opening, and unite. An elastic catheter is first to be introduced. In the successful operation of this kind, which was actually done, the flap was held by four sutures; and small slips of adhesive plaster, and a bandage to support the scrotum, were employed. In the course of the treatment, pressure was found necessary to prevent the occasional passage of urine through the wound. (*A. Cooper, Surgical Essays, Part* 2, *p.* 221, *&c.*)

Mr. Earle met with a case, in which the integuments in the perinæum, and above an inch of the canal of the urethra, had sloughed away in consequence of external violence. At the man's entrance into St. Bartholomew's Hospital, a large smooth cicatrix occupied the place of the urethra, no vestige of which remained in that part. The integuments on the right side had suffered less extensively than those on the left; so that when the catheter was introduced, that portion of the instrument which passed over the cicatrix could be about half covered, by drawing the skin and healed part from the right towards the opposite side. The treatment was therefore begun by confining the knees together over a pillow, and applying a kind of truss, which kept the skin constantly pressed towards the left side. While these measures were going on, the opportunity was taken of dilating the anterior portion of the urethra with bougies. Afterward the following operation, which I had the pleasure of seeing, was performed; a portion of the integuments was removed, about an inch and a half long, and one-third of an inch in width, on the left side of the cicatrix. The groove thus formed was intended for the reception of the edge of the skin to be detached from the opposite side. An incision was then made across the perineum, above and below, so as to pare away the callous edges of the urethra. The skin was next dissected off from a portion of integument on the right side of the perineum, about an inch and a half in length, and half an inch broad, leaving a smooth space of rather more than an inch between the cut surfaces. The integuments on the right side were now dissected up, turned over a catheter, and brought in contact with the opposite groove. The detached portion of cicatrix bled little during the operation, and before it could be applied to the groove, its edge had so livid an appearance, as to create an apprehension that it must perish. Two sutures were employed to assist in retaining it in the desired position, and some straps of adhesive plaster and a bandage completed the dressings. The day after the operation, it was evident that some urine had escaped by the side of the catheter; and on the third day, when the dressings were removed, it was found that the portion of flesh which had been deprived of skin, had sloughed; but that a sufficient quantity had united above and below to form a canal, open at one side, and large enough to include the whole catheter. After the parts had healed, some urine could be made to pass through the urethra, when pressure was applied to the left side of the remaining fistula. Various attempts were afterward made to excoriate its edges, and unite them, but without success.

A second operation was therefore done in the summer of 1820, and integuments were now borrowed from the opposite side to that from which they had been taken in the first operation. "A deep groove was made on the right side, the surface was denuded of its cutis to some extent, a considerable portion of integument was then detached from the left side, and in order to obtain healthy skin (says Mr. Earle) I encroached a little on the thigh, and laid bare the edge of the fascia lata. Instead of passing any ligature through the detached portion, the old quill-suture was employed, which was passed from the two outer cut surfaces. A pad of adhesive plaster was interposed between the ligatures and the flap of skin." The catheter was not left in the urethra, but introduced about three times in 24 hours. By this operation much more was gained, and about two-thirds of the deficient part of the canal were restored; but still a small aperture remained at the upper part. This opening could not be closed by touching it with escharotics, and consequently, a third operation on a smaller scale was done, which so nearly completed the cure, as to leave only an orifice large enough to admit a bristle, and this opening subsequently closed, and the patient remained quite well in March 1821. (See *Phil. Trans. for* 1821.)

Here we see the same art by which new noses and under-lips are formed, extending itself to cases where it may be the means of extricating some individuals from a state in which life is hardly desirable. The surgeon of judgment, however, will never forget, that such an operation is only indicated where the fistula is large, the urethra free from obstruction, and bougies and the catheter insufficient.

URINE, INCONTINENCE OF. This complaint is quite the reverse of retention of urine; for, as in the latter affection, the urine is continually flowing into the bladder, without the patient having the power to expel it; so, in the former it flows out, without the patient being able to retain it.

According to Desault, children are particularly liable to the disorder; adults are less frequently afflicted with it; and persons of advanced years appear to be still less liable to it. The last observation may seem an error to such practitioners as have met with numerous examples, where patients, advanced in years, were incapable of retaining their urine. The fact is, that the overflow of this fluid, or, in other words, its dribbling away through the urethra, in some cases of retention, of which it is only a symptom, has been too commonly confounded with an incontinence of urine, though the cases are as different in their nature as possible, and require very opposite modes of treatment. *In retentions, depending upon weakness and paralysis of the bladder, the involuntary dribbling of the urine* is generally only an effect of the other disease, and they prevail together. The distended bladder reacts upon the urine, and forces some of it out of the urethra, until the resistance of the sphincter and of the urethra are precisely equal to the expelling power. Sometimes the urine even dribbles away incessantly, as is found to happen when the action of the bladder is entirely destroyed; for being then constantly full, it cannot hold any more of the urine descending to it through the ureters, unless as much be voided through the urethra as is received from the kidneys, and as unremittingly as the addition from the latter organs continues to be made. Such case rather belongs to the article *Urine, Retention of*, than the present subject.

It is correctly remarked by Desault, that the causes of an incontinence of urine, strictly so called, are the very reverse of those of a retention. The latter case happens whenever the action of the bladder is weakened, and the resistance in the urethra increased. On the contrary, an incontinence originates, either from the expelling power of the bladder being augmented, while the resistance in the urethra is not proportionately increased; or from the resistance being lessened, while the expelling force continues the same. On these principles, Desault thought it easy to explain why the disorder should be most common in children; and one reason which he gives for the circumstance is, that in childhood there is more irritability than at any other period of life. The expulsion of the urine, he observes, is entirely effected by muscular action, while the resistance is merely owing to the sphincter vesicæ, the levatores ani, and perhaps to a few other inconsiderable fasciculi of muscular fibres; for the different curvatures of the urethra, and the contractile power of this tube itself, he thought, could make only a feeble resistance to the discharge of the urine. An incontinence happens in children, because the bladder contracts so suddenly and forcibly, that its contents are voided almost before these young subjects are aware of the occasion to make water, and without their being able to restrain the evacuation. There are also many children, who, from indolence, or carelessness, do not make water immediately the first calls of nature invite them, and who afterward, being urgently pressed, wet their clothes. In other young subjects, the sensation which makes the bladder contract, and accompanies the expulsion of the urine.

is so slight, that the function is performed without any formal act of the will,—without even exciting an impression sufficiently strong to disturb sleep. This is the case with such children as are troubled only with an incontinence of urine in the night-time. Increasing years, by diminishing the irritability of the bladder, and making man more attentive to his necessities, usually bring about a cure of the infirmity, which seldom continues till the patient has attained the adult state.

It was not, however, the doctrine of Desault, that no period of life, excepting childhood, is subject to incontinence of urine. On the contrary, he admits, that other ages are subject to it; but then it depends almost always upon a want of resistance to the escape of the urine. Thus, it may be occasioned by weakness, or paralysis of the sphincter vesicæ, or levatores ani: sometimes also by a forcible dilatation of the urethra, and loss of its elasticity, and, (as Desault might have added) its muscular power of contraction, since the microscopical observations of Mr. Bauer, tend to confirm the existence of muscular fibres on the outside of the membrane of the canal, though, as is elsewhere mentioned, their arrangement and mode of action are now represented to be quite different from what was formerly supposed. (See *Urethra, Strictures of the.*)

A calculus, a fungus, or any other extraneous body of an irregular shape, may lodge in the neck of the bladder, but not accurately filling it, may allow the urine to escape at the sides; or there may even be in the calculus grooves through which the urine may pass into the urethra.

A violent contusion, or forcible distention of the sphincter, is often followed by an incontinence of urine. Formerly, the complaint used to be very common after the mode of lithotomy called the apparatus major, and it is even at present not an unusual consequence of the extraction of calculi from females, either by dilatation or division of the meatus urinarius, and neck of the bladder.

Women, after difficult labours, and in whom the child's head has seriously contused and weakened the neck of the bladder, are also subject to a species of incontinence of urine; which, however, is in general experienced only when they laugh, or make exertions.

Incontinence of urine is stated by many writers to be an attendant on palsy and apoplexy. Here they mistake, what the French surgeons aptly call the "*retention d'urine avec regorgement*," for an incontinence. In such cases, the involuntary discharge of urine has been referred to paralysis of the sphincter of the bladder; but it is forgot, that the bladder itself also participates in the paralytic affection; for the sphincter now being a particular muscle, but only a fasciculus of fleshy fibres, formed, as Desault observes, by the junction of those which compose the inner layer of the muscular coat of the bladder, it can only be weakened in the same degree, and at the same time, as the rest of this organ. Besides, says Desault, it is proved, and all physiologists admit the fact, that the action of the bladder is absolutely necessary for the expulsion of the urine, and that when this organ cannot act, a retention always ensues. Although much less danger attends an incontinence than a retention of urine, the infirmity is a serious affliction; for as the patient's clothes are continually wet with a fluid that readily putrefies, the stench which he carries about with him, is offensive to himself, and every body who approaches him.

In children, the disorder usually gets well of itself, as they grow up and acquire strength. When they wet their beds really from idleness and carelessness, moderate chastisement may be proper, inasmuch as the fear of correction will make them pay more attention to the earliest call to make make water. However, it has always been my own belief, that this doctrine is carried to an unjustifiable extent, particularly in schools, and been a pretext for the most absurd kind of severity. Nor is it doubted by any man who understands the subject, that in almost all cases, the disorder is a true infirmity, arising from the causes already indicated, and not from indolence; the supposed crime taking place, in fact, when the child is asleep, and unconscious of what is happening.

If excessive irritability, and constitutional weakness, be the cause of incontinence of urine, and a very small quantity of urine forces the bladder to contract, the resistance of the urethra being involuntarily overcome, an endeavour should be made to lessen such irritability by the use of the warm, or cold bath, sea-bathing, tonics, chalybeates, good air, &c. And in order to prevent the accident from taking place in the night-time, the child should not take any drink for some time before being put to bed; the bladder should be always emptied before sleep; and if necessary, the child ought to be taken up in the night for the same purpose.

If the infirmity arises from a want of action in the parts, causing the resistance in the urethra, tonics may be externally and internally employed. However, when the disorder has been of long standing, Desault found that they rarely succeeded.

Palliative means are then the only resource; viz. instruments calculated either to compress the urethra, and intercept the passage of the urine, or to receive the fluid immediately it is voided. The first of these plans is more difficult to accomplish in women than men; but it may be executed by means of an elastic hoop, which goes round the pelvis, and from the middle of which, in front, a curved elastic piece of steel descends, and terminates in a small compress, which is contrived to cover accurately the meatus urinarius. (See *Œuvres Chir. de Desault par Bichat, T. 3, p. 95, &c.*)

Large blisters, applied over the os sacrum have often cured an incontinence of urine, both when the complaint seemingly arose from excessive irritability of the bladder, and from paralysis and loss of tone in this organ and the parts, which naturally resist the expulsion of the urine from it, the case being in fact a retention "par regorgement," or, as one might call it in plain English, a retention, combined with incontinence of urine. (See *Med. Obs. and Inq.*) As, in some of these cases, the blisters removed also a paralysis of the lower extremities, they might have furnished a hint to the practice of making issues for the relief of the palsy of the legs, connected with the diseased vertebræ.

URINE, RETENTION OF. It is observed by the experienced Mr. Hey, that a retention of urine in the bladder, when the natural efforts are incapable of affording relief, is, in male subjects, a disease of great urgency and danger. Persons advanced in years, are more subject to this complaint, than the young or middle-aged. It is often brought on by an incautious resistance to the calls of nature; and if not speedily relieved, generally excites some degree of fever.

The distinction, says Mr. Hey, which has sometimes been made between a *suppression* and *retention* of urine, is practical and judicious. The former most properly points out a defect in the secretion of the kidneys; the latter, an inability of expelling the urine when secreted.

The *retention of urine* is an inability, whether *total* or *partial*, of expelling, by the natural efforts, the urine contained in the bladder. The characteristic symptom of this disease, previous to the introduction of the catheter, is a distention of the bladder (to be perceived by an examination of the hypogastrium,) after the patient has discharged all the urine, which he is capable of expelling.

As this complaint may subsist, when the flow of urine from the bladder is by no means totally suppressed, great caution is required to avoid mistakes.

Violent efforts to make water are often excited at intervals, and during these strainings, small quantities of urine are expelled. Such a case may be mistaken for strangury.

At other times a morbid retention of urine subsists, when the patient can make water with a stream, and discharge a quantity equal to that which is commonly discharged by a person in health. Under this circumstance, Mr. Hey has known the pain in the hypogastrium, and distention of the bladder, continue till the patient was relieved by the catheter.

And lastly, it sometimes happens, that when the bladder has suffered its utmost distention, the urine runs off by the urethra, as fast as it is brought into the bladder by the ureters. Mr. Hey has repeatedly known this circumstance cause a serious misapprehension of the true nature of the disease.

In forming a correct judgment of all these cases, it is very necessary to recollect the important division of retentions of urine into the *complete* and *incomplete* forms; a distinction which will at once put the surgeon on his guard against a variety of errors.

In every case of retention of urine which the late Mr. Hey attended, the disease could be ascertained by an examination of the hypogastrium, taken in connexion with the other symptoms. The distended bladder forms there a hard and circumscribed tumour, giving pain to the patient when pressed with the hand. Some obscurity may arise upon the examination of a very corpulent person; but in all doubtful cases, the catheter should be introduced.

Mr. Hey has not adverted to the swelling in the rectum, or vagina; nor to cases of contracted bladder, where, of course, the information, derived in ordinary instances from the tumour above the pubes, cannot be had; but in other respects, his observations on the diagnosis are practical and correct.

Mr. Hey had seen only a few cases of *ischuria renalis*, or complete suppression of the secretion of urine. The disease proved fatal in all his patients except one, in whom it was brought on by the effect of lead, taken into the body by working in a pottery. It subsisted three days, during a violent attack of the colica pictonum, and was then removed, together with the original disease. Mr. Hey found no difficulty in distinguishing this disorder, in any of the cases, from the *ischuria vesicalis*, though, for the satisfaction of some of his patients, he introduced the catheter. (*Practical Obs. in Surgery, p.* 374, *&c.*)

Retention of urine, may be the effect of a great many different causes; as paralysis of the bladder; inflammation of its neck; the presence of foreign bodies in it; pressure made on its cervix by the gravid uterus; enlargement of the prostate gland; strictures in the urethra; &c.

Every case of retention of urine demands prompt assistance, but where the disorder presents itself in its complete form, the mischief of delay is of the most serious nature; for if the bladder remain preternaturally distended, it not only loses its contractile power, but is quickly attacked with inflammation and sloughing. At length some point of it bursts, and the urine is extravasated in the cellular membrane of the pelvis; spreading behind the peritoneum as far up as the loins, and in other directions, into the perineum, scrotum, and the integuments of the penis, and upper part of the thighs. The common result then of the rupture of the bladder, and the effusion of its contents, is the speedy death of the patient, from the effects of this irritating fluid upon all the parts with which it comes in contact, among which effects is inflammation of the peritoneum and bowels. It appears also from the observations, both of Desault and Sir Everard Home, that a complete retention of urine after a time has the effect of putting a mechanical stoppage to the further secretion of this fluid in the kidneys; a circumstance which sometimes has a principal share in producing death, particularly where this event happens before the urine becomes extravasated.

In all cases of retention of urine, the indications are sufficiently manifest; viz: 1st, to adopt such treatment as seems best calculated to procure a discharge of the urine through the natural passage, which object is performed, sometimes by means of fomentations, the warm bath, bleeding, opium, and other medicines; sometimes by the removal of mechanical obstacles to the flow of the urine; but more frequently by the use of the catheter, than any other means. When all these plans fail, it then becomes necessary to puncture the bladder. 2dly. The second indication, or that which presents itself after the immediate dangers of the distention of the bladder, are thus guarded against, is to remove whatever disease, or other circumstance, constitutes the still existing impediment to the natural expulsion of the urine.

With respect to the fit manner and time of employing the several means for fulfilling the above indications, and the selection which should be made of them, these are important considerations, which vary in different cases, and actually cannot be understood, without due reference to the causes and circumstances of each individual case. A part of this subject belongs also to other parts of this work, to which, in order to avoid the necessity of repetition, I here refer. (See *Catheter; Bladder, Puncture of; Prostate Gland, Diseases of; Urethra, Strictures of; &c.*)

With respect to catheters, we shall find that some cases require the urine to be drawn off two or three times a day, and the instrument to be taken out after each evacuation; while in other instances, it is prudent to keep the tube continually introduced. Here one general caution may be conveniently offered, which is, never to let a silver catheter remain in the passage more than a week or ten days, without taking it out and cleaning it; for if this be not done, the instrument becomes coated with deposits from the urine, so as afterward not to admit of being withdrawn through the urethra, without great suffering and irritation. The eye in the beak is also apt to become completely blocked up; and sometimes the pressure which the catheter makes on the part of the urethra, corresponding to the root of the penis, in front of the scrotum, causes in this situation inflammation, followed by a slough as large as a crown piece, and an opening, formed by the loss of substance is left, which may even continue fistulous during the patient's life. These remarks particularly apply to metalic catheters; but such as are supposed to be made of elastic gum, especially those ordinarily met with in the shops, are apt to spoil and become blocked up with mucus, if not taken out and cleaned, or changed, every five or six days. However, as I have mentioned in the article *Prostate Gland, Diseases of*, Mr. Weiss has succeeded in constructing elastic catheters, which will bear being retained more than a fortnight in the urethra, without becoming obstructed, besides having the advantage of always retaining a due curve.

1. *Of the Retention of Urine, to which persons of advanced age are liable.*—This disorder is so common in elderly persons, that it is generally allowed to be one of the grievances to which their period of life is particularly exposed. In them the bladder is less irritable than in younger subjects, and hence, it is not so soon stimulated by the presence of the urine. In fact, it is not until a painful sensation arises from the distention of the coats of the bladder, that the patient is aware of the occasion to discharge the urine. The bladder then contracts; but still would not be able to expel its contents, were it not for the powerful action of the abdominal muscles. Nor is the expulsion of the urine even now complete; since the bladder no longer retains the power of effacing the whole of its cavity. On the contrary, after each evacuation, some urine is still left undischarged, and already constitutes an incipient retention. The quantity daily augments, and at length, not more than half the fluid contained in the bladder is voided at each evacuation.

According to Desault, the complaint particularly attacks old subjects of a plethoric state of body, and of sedentary and studious habits. It also especially afflicts those who, from carelessness or indolence, do not take time enough to expel the last drops of urine; and others, who are accustomed to discharge their urine into a pot, as they lie in bed, instead of rising for the purpose.

In these cases, the urethra and neighbouring parts seem to be free from every disease, capable of preventing the issue of the urine; which has always come away freely, and in a full stream, although it could not be discharged with the same force, nor to the same distance, as formerly. At length, instead of describing an arch as it flows out, it falls down perpendicularly between the legs. Towards the close of the evacuation, the patient is also not sensible of the final contractile effort of the badder, of which he used to be conscious in his younger days. When he is about to make water, he is obliged to wait some time before the evacuation commences; and as the disorder increases, he cannot make water without considerable efforts; the quantity of urine, voided each time, manifestly decreases; the desire to empty the bladder becomes more and more frequent; and lastly, the urine only comes away by drops, and an incontinence succeeds a retention.

In this state, the patient's sufferings are not very great. The tumour, formed by the bladder above the pubes, is indolent, and, if it be pressed upon with some force, a certain quantity of urine is discharged from the urethra.

The retention of urine arising from old age is seldom complete: the urine, after having filled and distended the bladder, dribbles out of the urethra, so that the patient voids as much of this fluid in a given time, as he does in a state of health. Nor is this species of retention of urine commonly attended with very urgent symptoms. It does not occasion, like complete retention, a suppression of the urinary secretion in the kidneys; and as the urine escapes through the urethra, after the bladder is distended to a certain degree, the disorder is less apt to produce a rupture of this organ, and dangerous extravasations of the urine. The swelling of the bladder then continues without any particular suffering, except a sense of weight about the pubes and perineum. These circumstances have often led to serious mistakes, and the disease has been set down as an abscess or dropsy.

The indications are to evacuate the urine, and restore the tone of the bladder. When the retention is incipient, the proper action of the bladder will sometimes return after cold applications are made to the hypogastric region, or thighs, and the patient goes from a warm into a cool place in order to make water.

The patient must also be strictly careful to make water immediately the least inclination to do so is felt; for, if this precaution be neglected, the bladder grows more and more inert; the desire to make water subsides; and the retention, which at first consisted of only a few drops, very soon becomes complete. It would then be in vain, as Desault observes, to try the expedients above recommended. No stimulus will now make the bladder contract sufficiently to expel the whole of the urine, and the catheter is the only thing, by which this fluid can be discharged. This artificial mode of evacuation, however, only affords temporary relief; for as the bladder is slow in recovering its tone, a relapse would be inevitable, if the employment of the catheter were not continued. Hence this instrument must either be left in the bladder, or introduced as often as the patient has occasion to make water. When a skilful surgeon is constantly at hand, or when the patient knows how to pass the catheter himself, Desault thinks it better to introduce the instrument only when the bladder is to be emptied, by which means the inconvenience arising from the continual presence of a foreign body, will be avoided. In this case, either a silver catheter, or an elastic gum one, may be used with equal advantage; but if the instrument is to be kept in the bladder, one made of elastic gum, and provided with a curved stilet, is to be prefered. As in old subjects, the urethra is flaccid, a large catheter is generally found to enter more easily, than one of smaller diameter.

As the treatment must be continued for a long while, and the bladder seldom perfectly regains its tone in old age, the patient should be instructed how to introduce the catheter himself, and he is to pass it whenever he wants to make water. After a certain time, however, he may try if he can empty the bladder without this instrument. When he finds that he can expel the urine, he should certify himself by means of the catheter, that the last drops of this fluid are duly voided. Should they not be so, he must persevere in the use of the instrument.

In this sort of retention of urine, it has been proposed to throw into the bladder astringent injections: Desault tried them; but, he does not give a favourable report of the practice.

Warm balsamic, diuretic medicines; cold bathing; and liniments containing the tinctura lyttæ; have likewise been praised; but according to Desault, these means frequently prove hurtful to persons of advanced years, and are seldom useful. He restricted his own practice to the use of the catheter, which, when skilfully employed, often restored the tone of the bladder, and when it failed, other means also were ineffectual. A blister over the sacrum may deserve a trial.

Passing over the cases of retention of urine, referred by Desault to the effects of intemperance with women, and the immoderate use of diuretic drinks; cases which considerably resemble in their nature and treatment the retention, from the weakened state of the bladder in elderly persons, I proceed to another example of the disorder still more interesting to the practical surgeon.

2. *Retention of Urine from an Affection of the Nerves of the Bladder.*—These nerves may be affected either at their origin, or in the course of their distribution. Injuries of the brain are seldom followed by a retention of urine, but the complaint often accompanies those of the spinal marrow. A concussion of this medullary substance, from blows, or falls upon the vertebral column; the injury which it suffers in fractures and dislocations of the vertebræ, or from a violent strain of the back; its compression by blood, purulent matter, or other fluid effused in the vertebral canal, and the effects, which a caries of the spine has upon it; may all operate as so many causes of a retention of urine. This form of the complaint may also be the consequence of tumours situated in the track of the nerves, which are distributed to the bladder. Whether the retention of urine, common in typhus fever, arises from an affection of the nerves of the bladder, or from the general debility extending itself to the expelling powers, may be a question; but the liability of patients in fevers to this disorder should never be out of the practitioner's recollection.

When a retention of urine arises from injury or disease of the spinal marrow, an insensibility and weakness of the lower extremities are almost always concomitant symptoms. The patients suffer very little; most of them are ignorant of their condition; and do not complain of any thing being wrong in the functions of the urinary organs. The surgeon, aware that a retention of urine is common in these cases, should examine, whether there is any interruption of the evacuation, either by feeling the state of the abdomen just above the pubes, or by introducing a catheter.

As this species of retention of urine is only symptomatic, and not dependent upon any previous defect in the bladder, it is not in itself alarming; but with reference to its cause, it is exceedingly dangerous. Affections of the spine, complicated with injury of the spinal marrow, are often fatal. By means of a catheter, it is always easy to relieve the inconveniences, arising from the bladder not contracting, and thus fulfil the only indication, which this sort of retention of urine presents; viz. the evacuation of the urine. But this proceeding is merely palliative; and the bladder will not recover its contractile power, until the causes of its weakness are removed. The last then is the main object in the treatment, which must vary according to the nature and extent of the disorder.

The consideration in detail of all the means, which may be requisite for the relief of the different accidents and diseases of the spine, belongs to other parts of this work. (See *Dislocations and Fractures of the Vertebræ; Vertebræ, Disease of.*) In shocks and concussions of the spinal marrow, Desault had a high opinion of the benefit resulting from cupping. This was done on, or near the part of the back, which had been struck, and the number of scarifications was proportioned to the strength of the patient. The plan was sometimes repeated the same day, and for several days in succession; and when the patient could not bear the loss of more blood, dry cupping was employed, which in this country, would be deemed less efficacious, than stimulating liniments or blisters. In diseases of the spine, Desault also preferred the moxa, to caustic issues.

3. *Retention of Urine from Distention of the Bladder.*—Desault thought that this form of the disorder might very properly be called *secondary*, because it is invariably preceded and produced by a *primary* retention. Of course, its remote causes are all those circumstances, which may bring on the other forms of the complaint; but its immediate cause depends altogether upon the weakness and loss of irritability in the bladder, occasioned by the immoderate distention of its coats. The disorder frequently occurs in persons, who from bashfulness, indolence, or intense occupation, neglect to make water, when they first have the desire; or who cannot for a time empty the bladder, in consequence of some temporary obstruction in the urethra. Although the impediment to the escape of the urine no longer exists, and the bladder is in other respects sound, yet as this organ has been weakened by the excessive distention of its coats, it cannot now contract sufficiently to obliterate the whole of its cavity, and expel the last portion of urine.

The indication is simple; for there is not here, as in other retentions of urine, another disease to be remedied. The catheter, when left in the bladder, generally proves adequate to the restoration of the tone of this viscus. I do not conceive, however, that English surgeons will place any confidence in warm diuretics which were commended by Desault, though they may join him in the approval of a tonic plan of treatment in general. When the urine flows from the catheter in a rapid stream, and is projected to some distance, and when it also passes out between the catheter and the urethra, it is a sign that the bladder has regained its power of contraction, and that it can empty itself, without the aid of the instrument. In this circumstance, the catheter is to be discontinued, and the patient may gradually resume his usual mode of life. But when the urine passes through the catheter only in a slow stream, the catheter cannot be laid aside, without the bladder becoming distended again, and losing whatever degree of tone it may have recovered.

The time which the badder takes to regain its power of contracting, varies considerably in different cases. When the disease is accidental and sudden, it frequently goes off in a few days. When it has come on in a slow manner, it usually lasts about six weeks. However, the cure is not to be despaired of, if the paralytic affection of the bladder should continue much longer. Sabatier says that he has seen patients wear a catheter upwards of ninety days, and yet ultimately get completely well. When there is reason for believing, that the urine will come away of itself, the use of the catheter may be discontinued. When he makes water very slowly; when he is obliged to make frequent attempts; and when he feels a sense of weight about the neck of the bladder; this organ has not completely recovered its tone, and the employment of the catheter is still necessary. When the patient could make water tolerably well in the day, but not during the rest of the 24 hours, Sabatier has often seen benefit arise from the catheter being worn only in the night-time.

When three or four months elapse without amendment, Sabatier states his conviction, that the tone of the bladder is lost for ever. In this unfortunate case, the patient should continue the flexible catheter, which he should be taught to introduce himself, as often as necessary. (See *De la Medécine Operatoire*, T. 2.)

Among the means deserving of trial, when the contractile power of the bladder does not return with the use of the catheter, I have to mention the tincture of cantharides; blisters applied to the sacrum, and kept open with the savine ointment; and cold washes to the hypogastric region.

In all cases, where the incapacity of the bladder to contract, whether from weakness, or paralysis, is the cause of retention, and where, though the bladder continues distended, a certain quantity of urine is voided daily, mistakes are particularly liable to be made. Thus, besides the chance of the disease being mistaken for an abscess, as Colot states was not uncommon in his time, other errors may take place. Sabatier was consulted about a woman, who had been advised to repair to some distant mineral waters, with the view of dispersing a tumour, which remained after a difficult labour, and was supposed to be in the uterus itself. However, the swelling turned out to be only a retention of urine, as it disappeared as soon as the catheter was introduced. Here no suspicion had been entertained of the real nature of the case, because the patient had voided her urine in a voluntary manner, and in reasonable quantity, for the five, or six weeks, during which the swelling existed.

In a thesis by Murray, a case is recorded, in which the swelling of the bladder was so considerable, that it was mistaken for dropsy. The abdomen of a delicate woman began to enlarge, without any particular pain, and the cause was at first supposed to be pregnancy. This idea however, was removed by the enlargement increasing too rapidly, attended with a great deal of anasarca of the lower extremities, arms, and face. The patient was now considered to be dropsical; and a surgeon was sent for to tap the abdomen. The fluctuation in the belly was quite evident. Fortunately, before the operation was done, a trial of diuretic medicines was determined upon; and while this plan was going on, the patient was attacked with a total retention of urine for three days; a symptom, which she had not previously suffered. It was now judged prudent to pass a catheter, before the trocar was employed. Eighteen pints of urine were drawn off, and the swelling of the abdomen subsided. The next day, twelve more pints of urine were drawn off. The anasarca, which was entirely symptomatic, disappeared. The application of cold water re-established the tone of the bladder, so that when three pints of urine had been drawn off by means of the catheter, the patient herself could spontaneously expel three or four others, with the aid of pressure on the hypogastric region.

The retention of urine caused by weakness, or paralysis of the bladder, and the swelling above the pubes, may continue a long while, without any inconvenience, excepting a sense of weight about the hypogastric region, and frequent inclination to make water. Sabatier has known patients labour under the complaint more than six months.

4. *Retention of Urine from Inflammation of the Bladder.*—According to Desault, writers have ascribed different effects to an inflammation of the neck of the bladder, and to the same affection of the body of this viscus. They have in fact regarded the first case as a cause of retention; and the last as a cause of incontinence of urine. An inflamed, highly sensible bladder, instead of being weakened, has been supposed to acquire an increase of energy, and to contract with greater vigour. But if there had not been retentions of urine, which could be referred to nothing but inflammation of the bladder, still analogy might have undeceived us; for an inflamed muscle is never found disposed to contract, and if it be compelled to act, its action is always feeble.

Plethoric, bilious subjects, are said to be particularly liable to this species of retention. It is also frequently occasioned by the abuse of wine, or other spirituous liquors, heating diuretic drinks, or the external, or internal employment of lyttæ. This form of the complaint makes its attack suddenly, and may be known by the frequent desire to make water; the acute pain, in the region of the bladder; pain, which is increased by the efforts to make water, and which shoots up to the loins, and along the urethra to the end of the glans; by the frequency and hardness of the pulse, and other symptoms of fever; by the aggravation of the pain, when the hypogastric region is pressed; by the easy passage of a catheter into the bladder; by the acute pain, which is excited by the instrument touching the inside of this organ; and by the red, inflammatory colour of the urine.

In this case, the most prompt assistance is necessary. The urine, which is a source of additional irritation, should be drawn off. The catheter should be introduced with great gentleness, and merely far enough to let its eye pass beyond the neck of the bladder.

The inflammation itself is to be counteracted by the most powerful antiphlogistic remedies, large and repeated venesections; the application of leeches to the perineum, and hypogastric regions; the warm bath; glysters; fomentations on the abdomen; and cold mucilaginous beverages. When the inflammation extends to the other abdominal viscera, attended with hiccough, and vomiting, and continues beyond the sixth day, the patient's life is in extreme danger.

5. *Retention of Urine from Hernia of the Bladder.*—An inability to discharge the urine is a symptom generally attending hernia of the bladder. But the weakness of this organ is not always the sole cause of the infirmity; for the urethra itself makes greater resistance than natural to the issue of the urine. As the neck of the bladder is drawn out of its right position by the portion of this organ which actually protrudes, the beginning of the urethra also undergoes an elongation, and a change of its curvature, by being pressed towards the symphysis of the pubes, and its diameter is likewise diminished. The urine may also be detained in the pouch composing the hernia, in consequence of the communication between this and the rest of the bladder being too small, or indirect, or perhaps from the hernial portion not being compressed by the action of the abdominal muscle, or capable of any contraction itself. However, the

rest of this organ, within the pelvis, can itself rarely expel the last drops of the urine. Its complete contraction cannot be accomplished without great difficulty; and in the end it almost invariably follows, that the urine is retained both in the protruded and unprotruded portions.

When a retention, arising from a hernia of the bladder, is complete, and occurs in both parts of this organ, there is, in addition to the symptoms common to other retentions produced by weakness of the bladder, a more or less considerable swelling in the situation of the hernia. The tumour is unattended with any change of the colour of the skin; is not very tender; and it presents a feeling of fluctuation, sometimes obscure, sometimes very distinct. When the swelling is pressed upon, the desire to make water is excited, or increased, and occasionally a few drops escape from the urethra. As soon as the urine has been drawn off with a catheter, and the patient is put in a posture in which the protruded portion of the bladder is higher than the rest of this organ within the pelvis, the tumour subsides, and it is some time before it becomes large again.

When the hernia is recent, and the protruded portion of the bladder small and reducible, the part ought to be returned and kept up with a truss. When the part is adherent and irreducible, the swelling ought to be emptied by pressure, and supported with a suspensory bandage. If the hernia could in this manner be made gradually to return into the abdominal ring again, a truss would afterward be requisite. Proposals have been made to endeavour to excite adhesive inflammation in the cavity of the protruded part of the bladder by compression, gradually increased, and thus obliterate the pouch, in which the urine lodges. Although Desault thought the attempt cautiously made justifiable, he deemed the result very uncertain.

Were the retention of urine accompanied with a strangulated state of the protruded bladder, and the contents could not be pressed into the other part of this organ, a puncture of the swelling with a trocar has been advised. But if there were an enterocele also present, as often happens, this operation would be attended with risk of injuring the intestine. Hence, Desault preferred opening the tumour by a careful incision, and he even approved of cutting away the protruded cyst, if the communication betwixt it and the rest of the bladder were obliterated. For additional observations, I refer to the 2d vol. of the First Lines of Surgery, Ed. 4.

6. *Retention of Urine, caused by displacements of the Viscera of the Pelvis.*—The displacements, here signified, are a retroversion, prolapsus, and inversion of the uterus, and a prolapsus of the vagina, or rectum. When the intimate connexions of the bladder with the uterus and vagina in the female, and with the rectum in the male subject, are considered, it is obvious, that the latter parts cannot be displaced, without drawing along with them the bladder; and that, in this state, whatever may be its contractile power, it cannot contract so perfectly as to expel the whole of the urine. To this deficient action of the bladder is necessarily joined an increase of resistance on the part of the urethra; for, the beginning of this canal being drawn by the bladder, changes its accustomed direction, and such alteration cannot be made without the sides of the tube being pressed together. Thus the retroverted uterus draws the os tincæ above the pubes, and the posterior part of the bladder is displaced, which, in its turn, draws along with it the commencement of the urethra, pulls it upwards, and increases the curvature, which this canal describes under the symphysis of the pubes, against which it is forcibly applied.

In a prolapsus, or inversion of the womb, vagina, and rectum, the back part of the bladder, instead of being drawn upward and forward, is pulled downward and backward, and the curvature of the urethra is totally altered. Below the pubes the bladder forms a convexity, and not a large concavity, as in the instance of a retroversion of the womb. This position of the parts should always be recollected in passing the catheter, as it shows what curvature and direction should be given to the instrument, in order to facilitate its introduction.

These retentions of urine are not often followed by any very bad consequences. It is generally sufficient to rectify the wrong position of the bladder, and the commencement of the urethra, by the reduction of the displaced viscera, and a cure is then a matter of course, unless the excessive distention should have induced considerable weakness of the bladder, in which event, recourse must be had to the means previously recommended for this state of the organ. The reduction of the viscera generally forms the first indication, and the manner of accomplishing it is described under the head of *Uterus*. When the reduction is not immediately practicable, or when it fails to remove at once the retention of urine, the catheter is to be used. Frequently, when the urine has been drawn off, the reduction becomes more easy; but, sometimes, the altered direction of the urethra renders the introduction of the catheter difficult; nor will the instrument pass, unless it be accommodated to the preternatural state of that canal. Thus, in the retroversion of the uterus, a catheter, very much curved, answers better than one nearly straight, like that commonly used for females.

A curved catheter, says Desault, also answers in cases of prolapsus uteri, &c.; but with this difference, that, in a retroversion, the concavity of the instrument must be turned towards the pubes, but, in the prolapsus, towards the anus. Sometimes the catheter will not pass unless it be rotated, as it were, and sometimes, when a silver catheter cannot in any manner be introduced, an elastic one will readily enter.

Were every effort to reduce the viscera, and pass a catheter unavailing, and the hazard of the bladder giving way urgent, the surgeon would be called upon to let out the urine with a trocar. (See *Bladder, Puncture of.*)

7. *Retention of Urine from the pressure of the Uterus, or Vagina, on the Neck of the Bladder.* Besides the distention of the uterus and vagina in pregnancy and parturition (which cases I mean to pass over as belonging more properly to midwifery,) there are other conditions of these organs which may give rise to a retention of urine. Thus it sometimes arises from the presence of various kinds of tumours, or collections of blood, or other fluid in the uterus, or ovary; or the distention of the vagina with the menses, pessaries, &c.

In such cases, the retention of urine being only symptomatic, the prognosis must depend upon the nature of the cause, of which the interruption of the urinary evacuation is only an effect. The latter complaint is here not very dangerous, because its inconvenience may be obviated by means of the catheter. But when the cause of the retention of urine is easily removed, and the tone of the bladder is not impaired, even the catheter is not always necessary, as when the complaint is induced by a pessary, or collection of blood in the vagina. In other examples, in which the cause of the difficulty of making water cannot be immediately obviated, as in cases of tumours, the catheter must be employed. In scirrhous and cancerous diseases of the uterus, also, this instrument is the only means of relieving the retention of urine, as nature and art can do little for the removal of the cause. It ought to be known, however, that as these last diseases increase, an incontinence often succeeds to a retention of urine, in consequence of ulceration taking place between the upper surface of the vagina and the lower part of the bladder.

8. *Retention of Urine from pressure of the Rectum upon the Neck of the Bladder.* Abscesses in the vicinity of this intestine, hemorrhoidal tumours, alvine concretions, and the scirrho-contracted state of the gut, &c. may bring on a retention of the urine by pressure on the neck of the bladder. The irritation, also, existing in these cases, may tend to produce the complaint by exciting a spasmodic contraction of the adjacent part of the urethra. Here the relief of the retention of the urine is to be effected by removing, or curing the other disorder, which operates as its cause. If this cannot be immediately accomplished, the catheter must be used, though, in several instances, it will be better to avoid even the irritation of the catheter, and try the effects of bleeding, the warm bath, and opium, which will frequently enable the patient to make water. The last means, however, will not suffice, when the cause of the retention is likely to continue a long time.

9. *Retention of Urine from Foreign Bodies in the Bladder.* Without stopping to consider the uncommon kinds of retention produced by carcinoma, fungous diseases, and hydatids in the bladder, let us pass on to the case, in which the urine is obstructed by a calculus at the neck of the bladder. Here the patient, by altering his position, frequently changes the situation of the stone, and is immediately able to make water again. However, this expedient will only procure relief while the calculus is loose in the cavity of the bladder; for, after it has become fixed in the commencement of the urethra, it must either be pushed back with a catheter, taken hold of and brought out with the urethra forceps used by Sir A. Cooper, or extracted by a kind of operation resembling the apparatus minor. See *Lithotomy.*

Many instances of various kinds of worms in the bladder are upon record. On this subject, an interesting paper was published a few years ago, by my friend Mr. Lawrence, who met with an example, in which an undescribed species of worms was abundantly voided from the bladder. "The origin of those animals (says Mr. Lawrence) which inhabit the internal parts of living bodies, is involved in much obscurity. Although the intestinal worms appear manifestly, from their peculiar form, consistence, and organs, to be particularly designed for those situations in which they are found; although they have generative organs, and no similar animals are known to exist out of living bodies, yet it has been generally conceived, that the germs, from which they spring, enter from the mouth. The production of hydatids in various parts of the body, cannot however, be accounted for on such a supposition; neither can we very easily conceive, that ova should enter from without into the urinary organs." The following facts, also stated by Goeze (as Mr Lawrence observes,) entirely overturn this opinion. Professor Brendel, of Gottingen, found ascarides in the rectum of an immature embryo. Blumenbach discovered tæniæ in the intestinal canal of young dogs a few hours after birth, &c. (*Versuch einer Naturgeschichte der Eingeweidewürmer, p.* 55.) The case, which Mr. Lawrence has recorded, exhibits an unquestionable instance of peculiar and undescribed worms, voided from the urinary passages. This gentleman says, that he knows of no other case, in which a distinct species of worm has been clearly proved to come from the bladder. Most of the cases published were instances of common intestinal round worms, which sometimes perforate the intestines and are discharged by abscesses, or get into the bladder, after the formation of adhesions betwixt this organ and the bowels. In other instances, coagula of blood, mucus, or portions of the mucous coat of the bladder, have been mistaken for worms; and as Mr. Lawrence further observes, some of the descriptions can apply only to larvæ of insects. Two specimens of this last sort, he has seen himself, which were sent from the country as worms voided from the bladder. (See *Medico-Chir. Trans. vol. 2, p.* 382, *&c.*)

In whatever way these animals get into the bladder, a retention of urine may be produced, either when they are numerous, or when there is only one present, but large enough to obstruct the vesical orifice of the urethra. In the very curious example related by Mr. Lawrence, the passage of the urine was obstructed, and the use of the catheter continually necessary. The oil of turpentine was given internally, with some appearance of benefit at first; but, it afterward brought on febrile symptoms and erysipelas, and its exhibition could not be kept up. It was then injected into the bladder, with an equal part of water. This rather accelerated the discharge of the worms; but they came away at times, whether the injection was used or not, and as this means produced the erysipelatous indisposition again, it was left off. Olive oil was afterward injected; the irritation after it was less, and the fits of pain about the bladder less violent. It was calculated that at the time when Mr. Lawrence was writing the particulars of the case, from 800 to 1000 worms had been discharged. For a detail of the symptoms, and a particular description of the worms themselves, we must refer to the above-mentioned publication.

According to the observations of Desault, a retention of urine is frequently occasioned by coagula of blood in the bladder. The blood is said sometimes to come from the kidneys, sometimes from the bladder, and sometimes it even regurgitates from the urethra. While fluid, it may be expelled with the urine; but, when coagulated, it is no longer capable of being discharged. It is the blood, which passes into the bladder, after wounds, or the operation of lithotomy, that is most disposed to coagulate. If the clots were too large to pass through a catheter, the best plan would be to inject into the bladder lukewarm water, for the purpose of loosening and dissolving them.

A retention of urine, has sometimes arisen from the entrance of a piece of bougie into the bladder. Even whole bougies, which had not been properly secured, have been known to glide into the cavity of that organ. As Desault observes, the urethra appears to possess a kind of antiperistaltic action, by which it tends to draw into the bladder whatever substances it includes; for, says he, it is constantly noticed, that when these substances are once within the urethra, if they be not expelled by the urine, they always advance towards the bladder; a circumstance; which cannot be accounted for by their weight.

The insinuation of these foreign bodies into the bladder is a serious occurrence both for the patient and surgeon. The former cannot avoid the consequence which will sooner or later originate from the extraneous substance, except by submitting to a dangerous and painful operation: the latter will be accused of being the author of all the evil, and will find it difficult to exculpate himself. In order to obviate the necessity of cutting into the bladder, in such cases, Desault proposed the use of small spring-forceps, passed into the bladder through a cannula, but, although the instrument seemed to answer on the dead subject, no instances of its doing so on living patients are on record. Were any instrument likely to succeed, I think it would be the urethra-forceps, shaped like a sound, employed by Sir A. Cooper for the extraction of small calculi from the bladder. (See *Lithotomy and Urinary Calculi.*

10. *Retention of urine from Inflammation of the Urethra.* In order to comprehend the mechanism of this case, it is necessary to remember, that inflammation never exists, without swelling, and that every tumefaction of the lining of the urethra, must necessarily lessen its diameter. Inflammation of the urethra is most commonly produced by the external application, or internal exhibition, of lyttæ; by gonorrhœa; the unskilful use of the catheter; the employment stimulating injections; bougies; &c. Together with the lessening of the canal by the effect of swelling, there can also be no doubt, that, in many of these instances, a spasmodic contraction of the urethra and neck of the bladder also contributes to the retention of urine. Although Desault believed that inflamed parts, endued with a contractile power, were not disposed to contract in that state, yet, it should be recollected, that even admitting this to be true, the whole length of the urethra is seldom inflamed, and a part of it may therefore be affected with a spasmodic action, without the theory espoused by Desault being at all implicated. The effects of opium, tobacco, and other antispasmodics, often evinced in immediately relieving these kinds of retention of urine, seem indeed to leave no doubt respecting the existence of a sort of spasm in the passage. Whatever may be the cause of inflammation of the urethra, the diagnosis is free from all obscurity. Besides the general symptoms of inflammation, the patient complains of a scalding sensation in the passage: he experiences a great deal of smarting, which is sometimes insupportable, when he makes water; the penis becomes in some degree swollen, and more tender; and a very little pressure on the urethra gives acute pain. In the mean time, the stream of urine becomes lessened; and, at length, this fluid can only be voided in a very narrow current, or only by drops, and often not at all.

The disorder is to be treated on antiphlogistic principles. Diluting, cooling, mucilaginous, beverages; venesection; leeches to the perinæum; the warm bath; opium, particularly in the form of clysters, and fomentations, are the means which usually give relief. When inflammation exists in the urethra, it is always desirable to avoid, as long as possible, the employment of catheters, which create irritation, and of course increase the cause of the retention. It is particularly, in cases of this description, and in the retentions of urine, arising from strictures, that Mr. Earle has suggested the use of tobacco in the form of clysters; a method, deserving adoption when the means above enumerated are unavailing, and it is preferable to the catheter, because it does not cause any increase of irritation and inflammation in the urethra. (See *Med. Chir. Trans. vol.* 6, *p.* 82, *&c.*)

11. *Retention of Urine from Laceration of the Urethra.* The urethra is sometimes ruptured by violent contusions on the perinæum; and the rough and unskilful use of bougies and catheters. The consequences usually are, an extravasation of urine in the cellular membrane of the scrotum and penis; a considerable dark-coloured swelling of these parts, often followed by sloughing; and retention of urine. The treatment consists in introducing an elastic gum-catheter into the bladder, with as little delay as possible, and keeping it there until the breach in the canal is repaired. At the same time, the evils threatened from the effusion of the urine are to be lessened as much as possible, by making two or three free incisions in a depending part of the swelling, and the employment of fomentations, and antiphlogistic remedies.

12. *Retention of Urine from Tumours situated in the Perinæum, Scrotum, or Penis.* A retention of urine has been known to arise from phlegmonous swellings and abscesses; extravasations of blood; and urinary tumours and calculi formed in the perinæum and scrotum; also from the pressure of a sarcocele; hydrocele; a very large scrotal hernia; an aneurism of the corpus cavernosum; a ligature on the penis; &c.

The radical cure of all such retentions of urine can only be accomplished by curing the disease, on which they are dependent. However, until the cause can be obviated, the urine must be drawn off with a catheter. Elastic gum-catheters usually enter more easily than those made of silver, as by their flexibility they accommodate themselves better to any deviation of the urethra from its ordinary direction. Desault particularly recommended a catheter of middling size to be selected, and introduced, armed with its stilet, until it stops in the canal; when he advised withdrawing the stilet for about an inch, in order to leave the beak of the instrument quite free, so that it may follow the curve of the urethra. Then the tube and the stilet are to be pushed further into the canal, care being taken, however, to keep the stilet drawn back some distance from the extremity of the instrument. By these precautions, says Desault, the catheter may always be got into the bladder. Should the introduction prove neither painful nor difficult, Desault thought it better not to annoy the patient by making him continually wear the instrument.

13. *Retention of Urine from Disease of the Prostate Gland.* As a great deal has been said concerning this case in a foregoing article; (see *Prostate Gland,*) I shall not here detain the reader long upon the subject.

When the swelling of the prostate gland is of an inflammatory kind, the retention of urine makes its appearance with the same kind of symptoms as attend inflammation about the neck of the bladder.

Here similar treatment to that commonly adopted for the retention of urine produced in the latter case, is indicated; particularly bleeding, fomentations, the warm bath, opening medicines, anodyne clysters, the tinctura ferri muriati, and in very obstinate urgent cases, an enema of tobacco. If these means fail, the surgeon may gently endeavour to introduce an elastic gum catheter.

The symptoms of the retention of urine, caused by chronic enlargement of the prostate gland, and the reason of the impediment to the discharge of that fluid in such a case, are explained in another part of this work. (See *p.* 378, *&c. Vol.* 2.) From the remarks there introduced, it appears, that when the regular evacuation of the urine begins to be impeded, the catheter becomes indispensable, though the surgeon will often be foiled in his endeavour to draw off the urine with it unless he be duly acquainted with the morbid changes produced in the parts. And, as Sabatier long ago very correctly observed, the urine may not be discharged though the instrument enter a considerable way, either because its beak becomes entangled in the prostate gland, or *between a swollen portion of this gland and the neck of the bladder,* and does not reach the urine. Hence Sabatier recommended the employment of a catheter with a very long beak, which should also be bent considerably upwards. When, however, all efforts to pass a catheter fail, the only resources are to force a passage with a conical catheter, as explained in Vol. I, or to puncture the bladder above the pubes. (See *Bladder, Puncture of.*) In this case, the operation should never be done through the perinæum or rectum, as the great size which the diseased prostate gland sometimes attains, would be an obstacle to making a puncture in either of these situations. Puncturing the bladder, however, is only a temporary means of relief; and until a catheter can be passed quite into the bladder, the cannula of the trocar should not be withdrawn.

The objections to leaving the cannula in the wound any considerable time, are the irritation of the extraneous body; the fear of calculous incrustations forming both on the outside and inside of the cannula; and the hazard of not being able to find the track into the bladder again, if the instrument were taken out for the purpose of being cleaned. However, Sabatier approves of the practice under the foregoing circumstances. And Colot adduces two instances in which it proved very serviceable. Sabatier also refers to another example of similar success, related in the thesis by Murray. When Dr. Murray saw the patient, the cannula had been worn more than a year. The patient was sixty years of age, and enjoyed very good health. He was in the habit of taking a stopper out of the cannula every four hours. The wound had healed very well all round the tube, and was quite free from redness. (*Sabatier, Médecine Opératoire, T.* 2, *p.* 140.) For further observations, see *Catheter* and *Prostate Gland.*

14. *Of the Retention of Urine produced by Strictures in the Urethra.* From the account, which is given of strictures in another part of this Dictionary, (see *Urethra, Strictures of,*) it appears that almost every stricture, bad as it may be, is capable of being rendered still worse, and the morbid part of the urethra more impervious by a spasmodic affection. Going out of a warm into a cold situation, drinking, and other kinds of intemperance, will often bring on an irritable state of the canal, attended with a spasmodic action of the strictured part, an increased difficulty of voiding the urine, and even a total retention of this fluid. The patient makes repeated efforts to relieve himself; but hardly a drop of urine is discharged. In the meanwhile the bladder becomes filled, and ascends above the pubes; the abdomen grows tense and painful; fever comes on; the countenance looks red; the brain becomes affected; and circumstances assume an extremely urgent appearance.

In this case, antiphlogistic means should be adopted without delay. The patient ought to be bled, if nothing in his constitution and age prohibit this evacuation, which it may even be proper to repeat. He should also be put into the warm bath, and fomentations should be continually applied to the hypogastric region. Slightly diuretic beverages may be prescribed, and leeches put on the perinæum. The principal means, however, from which the greatest benefit may be expected, is a liberal dose of the tinctura opii, together with an anodyne glyster. This is also another example, for which Mr. Earle has particularly recommended the exhibition of tobacco in the form of a clyster; and he has related a case in illustration of the efficacy of the plan. (See *Medico-Chir. Trans. Vol.* 6, *p.* 88.) The tinctura ferri muriati, which, according to Mr. Cline, has a specific effect in overcoming spasm of the urethra, seems also worthy of trial. Indeed it should always be tried before tobacco, which being sometimes violent in its effects, ought perhaps to be the last resource in the way of medicines. When such measures fail in enabling the patient to empty his bladder, and this viscus is becoming more and more distended, an immediate attempt should be made to introduce a small flexible elastic gum-catheter through the stricture or strictures into the bladder, which object may be frequently accomplished, when due care, perseverance, and gentleness, are not neglected.

Sometimes when a small flexible catheter cannot be introduced, a fine bougie admits of being passed into the bladder, and on being withdrawn, the urine follows, and is discharged.

When all the preceding plans prove unavailing, and the danger arising from the retention of urine continues to increase, either the stricture must be forced with the conical sound, an incision practised behind the obstruction, or the bladder punctured. The cannula of the trocar should then be left in the wound till the strictures are either cured, or at least till the urine resumes its natural course.

15. *Retention of Urine from the Lodgment of Foreign Bodies in the Urethra.* That such accident must obstruct the discharge of urine is too plain to need any particular explanation. Calculi are the most common substances which bring on this kind of case; but articles, introduced into the urethra from without, such as bougies, large pins, &c. are occasionally lodged in the passage; and I once extracted from a man's urethra a long black pin, with which he had been examining the passage. The head of it was towards the perinæum, and the point about two inches from the orifice of the glans. I passed the point through the lower surface of the urethra, and then taking hold of it, drew it further out, turned the head towards the glans, from the orifice of which it was then easily removed. When substances like calculi lodge, oily injections are sometimes tried with the view of rendering the passage more slippery; and occasionally the dilatation of the canal with bougies or catheters, followed by a very forcible expulsion of the urine, has answered. The ancients sometimes tried the effect of suction. When the foreign body is closely embraced by the urethra, and it cannot be pushed forward with the fingers, Desault recommends endeavouring to extract it with the forceps, invented for the purpose by Mr. Hunter, and which are contained in a cannula; or the urethra forceps, spoken of in the articles *Lithotomy* and *Urinary Calculi* might be employed. When, however, the foreign body is too large to be taken out in this manner, it must be extracted by an incision. If an elastic catheter be now kept in the urethra, so as to prevent the urine from coming into contact with the cut part, the wound will heal very well. Some time ago there was published a case of calculus in the urethra, attended with dysury, where almost instantaneous relief was obtained from the exhibition of a tobacco clyster. The patient soon felt a strong desire to void his urine; and "upon making the attempt, a large calculus came rolling along the urethra, with complete relief of all his complaints." (See *Edinb. Med. and Surg. Journal. Vol.* 12, *p.* 373.)

Fr. M. Colot, Traité de l'Opération de la Taille; avec des Obs. sur la Formation de la Pierre, et les Suppressions de l'Urine, &c. 12*mo. Paris,* 1727. *Sabatier, De la Médecine Opératoire, T.* 2. *C. B. Trye, Remarks on Morbid Retentions of Urine, 2d Ed.* 8*vo. Gloucester,* 1784. *Hey's Practical Observations in Surgery. Schreger Chirurgische Ver-*

suche, p. 187, *&c. der Ischuria Calculosa,* 8vo. *Nurnberg,* 1811. *Desault's Parisian Chirurgical Journal. S. T. Sœmmering, Abhandlung über die schnell und langsam todtlichen Krankheiten der Harnblase und Harnröhre bey Männern in hohen Alter.* 4to. *Frank.* 1809. *Richter, Anfangsründe der Wundarzneykunst, B.* 6, *p.* 210, *&c. Œuvres Chir. de Desault par Bichat, T.* 3. *Desault et Chopart, Traité des Maladies des Voies Urinaires,* 8vo. 1796. *Nauche, Nouvelles Recherches sur les Retentions d'Urine par Retrecissement de l'Urétre, et par Paralysie de la Vessie, &c.* 8vo. *Paris,* 1806. *Home's Practical Observations on the Treatment of Strictures, &c.* 3 *vols. and on Diseases of the Prostate Gland,* 2 *vols.* 8vo. *Lond.* 1811—1818. *H. Earle, in Medico-Chir. Trans. Vol.* 6, *p.* 82, *&c.*

UTERUS, INVERSION OF. This case may either be complete or incomplete. When it is incomplete, only the fundus of the uterus passes through the os tincæ. When the inversion is complete, the uterus becomes entirely turned inside out, passing through the opening in its cervix, dragging along with it a part of the vagina, and descending more or less far down, sometimes even between the patient's thighs.

The inversion of the uterus mostly arises from the manner in which the placenta is extracted after delivery. Immediately after parturition, the uterus is not yet contracted, and its cervix is in a widened state. When things are thus disposed, the uterus may easily follow the after-birth, which is attached to it, and thus become inverted. The event is particularly liable to happen. 1st, When a premature attempt is made to extract the placenta. 2dly, When the funis is pulled outward, without due care being taken to support the uterus with the fingers of the left hand. 3dly, When the operator draws out the after-birth too roughly and violently. Though the placenta is sometimes so adherent that its extraction is difficult, and a risk must be encountered of dragging down the uterus with it, this disagreeable accident may generally be avoided by performing the necessary separation of the parts with the fingers introduced into the cavity of the uterus.

The inversion, following delivery, does not always proceed from unskilfulness; but sometimes happens, notwithstanding every precaution, either because the patients themselves make too violent efforts, or because the uterus is enlarged and heavy; or else in consequence of some predisposition, some unusual laxity of the organ, which can neither be foreseen nor prevented. Ruysch saw an inversion of the uterus take place, after the expulsion of the placenta, although delivery had occurred in the most favourable way.

Mr. Windsor believes, that where the uterus and vagina are in a relaxed state, and the female has been subject to prolapsus uteri, there is a greater disposition to the occurrence of inversion, at the time of labour, than when such condition of the parts does not exist. (*Med. Chir. Trans. Vol.* 10, *p.* 360.)

A tendency to the accident is very common in women who have once been afflicted with it. Amand mentions a woman, who had an inversion of the uterus after her first delivery, but the part was reduced. She was attended by Amand again in her next confinement; and another inversion of the uterus, quite as bad as the first, would have happened, had not he, on perceiving the disposition to the accident, introduced his finger into the cavity of the uterus, and separated the placenta from its attachments, before making any attempt to extract it.

Besides causes, connected with parturition, there are others of a different nature. Ruysch, Mauriceau, and Lamotte, supposed an inversion of the uterus could only happen at the time when the placenta was extracted, or a little while afterward. The accident seemed to them impossible at any other period, both on account of the thickness of the uterus, and the smallness of the os tincæ. However, many facts prove that the case may also depend on internal causes, and affect women who have never had children, as well as others who have had them. Thus polypi of the uterus may bring on inversion of the part. As their pedicle is attached to the fundus of the uterus, they may easily drag it downward when its texture is lax and soft, particularly as the operation of their weight is continual. (See *Denman's Plates of a Polypus with an Inversion of the Uterus. Fol.* 1801.) Uterine hemorrhages may also be conducive to the accident, both because they relax the texture of the uterus, and because they are usually attended with acute pain, which makes the diaphragm and abdominal muscles act upon the uterus with all their power.

Levret speaks of a case of inversion of the uterus, where the displacement was not noticed until five years after delivery. In this example, it is conjectured that the very gradual and slow formation of the disease must have been the reason of its not having attracted earlier attention. (*Dict. des Sciences Méd. T.* 23, *p.* 288. *Also Baudelocque, in Brogniard, Bulletin des Sciences,* 2, *N.* 1.)

When an inversion of the uterus takes place after delivery, there are certain symptoms by which it may easily be known. The uterus, in its natural situation, thickened and swelled as it is at this period, presents itself in the hypogastric region in the form of a round circumscribed tumour; but when it has fallen downward, and become inverted, a vacancy is felt in the situation which it ought to occupy. When the inversion is incomplete, an examination with the fingers detects in the vagina a tumour, shapen like the segment of a sphere, having a smooth surface, and being surrounded with the cervix uteri, as with a kind of collar, round which the finger may easily be passed, either between it and the uterus, or between it and the vagina. When the inversion is complete, which case is more rare than the preceding, a tumour may be felt in the vagina, from which it sometimes even protrudes, apt to bleed, of an irregularly round shape, hanging by a neck, the lower part of which is surrounded by the above circular, thick, fleshy substance, consisting of the os uteri itself. The slightest touch makes the swelling bleed. The part has a red colour, which, however, generally diminishes in proportion to the duration of the displacement. In time, indeed, its surface becomes less sensible to external impressions, and only bleeds at the menstrual periods, the blood oozing from every point of the swelling, and not issuing from a single aperture at the lower part of the tumour, as in cases of prolapsus uteri.

In the incomplete inversion, patients feel acute pain in the groins and kidneys, an oppressive sense of heaviness in the hypogastric region, and a tenesmus, which, compelling them to make violent efforts, forces the uterus further down, and sometimes produces a total inversion of it. Besides these symptoms, more or less copious hemorrhages also occur. When the inversion is complete, the pain is more acute, the loss of blood more considerable, and the patient often affected with peculiar weakness, followed by cold sweats, convulsions, and delirium.

In both forms of the disease, if the reduction be not almost immediately effected, fatal consequences frequently ensue, either very soon after the accident, from the violence of the hemorrhage, or at a more or less remote period, partly from repeated losses of blood, and partly from the constitutional irritation and disturbance incessantly kept up.

Happily, as Mr. Windsor observes, the accident admits of remedy, if an intelligent person be present to replace the uterus; for if this be done immediately, and the hand of the accoucheur be retained in the cavity of this organ, until it has contracted, and the patient afterward confined to the recumbent posture, she will generally do well. An unsettled point appears to be, whether the placenta, if still remaining, should be extracted before, or after the reduction. Mr. Windsor, who appears inclined to prefer the latter method, refers to two examples, in which each plan was followed by a recovery. (See *Med. Chir. Trans. Vol.* 10, *p.* 360.)

And, in all cases, as the same author remarks, the accoucheur, after the expulsion of the placenta, should assure himself by manual examination, that the os internum is free, while an endeavour is made to feel the uterus with the hand placed upon the abdomen. "In consequence of the neglect of this practice (says Mr. Windsor) it is to be feared, that many lives have been lost; the true cause of the succeeding hemorrhage not being ascertained till too late, as happened in the fatal case that occurred to a midwife here (Manchester) last winter." Some women perish at once, or within a few hours, and, when they live longer, the reduction is exceedingly difficult, because the uterus and its cervix are becoming more and more contracted.

In the reduction, Sabatier regards the interposition of linen, between the hands and the uterus, as unnecessary and even disadvantageous, because it prevents the practitioner from having the assistance of a correct feel of the part. The trial should be continued as long as the patient's strength will allow. However, if the tumour were in an inflamed state, it would be prudent to put the patient in the warm bath, use emollient applications, and exhibit anodyne and laxative medicines, &c.

When the reduction cannot be accomplished, many die, while others survive, subject to an oppressive sense of weight, and frequent hemorrhages, which bring on great emaciation. Sabatier attended two patients, who had an inversion of the uterus, six months, and yet they were able to go about their family affairs. The same author had heard of other women, who had been afflicted with an inversion of the uterus several years.

If the reduction cannot be performed, and the patient survive the immediate effects of the injury, "some degree of inflammatory symptoms, accompanied with fever, ensues. The abdomen becomes full, tender to the touch, and, at its lower part, sometimes rather hard. There is costiveness of the bowels, and sometimes retention of urine, requiring for a time the use of the catheter. By the use of fomentations, enemata, laxatives, and an antiphlogistic regimen, the symptoms abate, the power of expelling the urine, especially if the uterus is first raised a little in the vagina, is regained, and the patient gradually recovers the full power of this function. Afterward she becomes able to walk about, suckles her infant, and perhaps enjoys apparently even a tolerable state of health; yet, the sanguineous discharges generally after a time," return profusely, and her pale countenance, and emaciated appearance indicate the greatest debility.

"About the time, when she relinquishes the office of suckling, the menses return more regularly, the discharges of blood are very considerable in quantity, or of long duration; the mucous discharges are generally copious at other times; and the constitution begins to sink under the reiterated losses it sustains. The pulse becomes frequent, the appetite is impaired, a cough, with hectic symptoms sometimes occurs, and the patient is quite unable to pursue her usual domestic duties. In this state palliative means, as the use of astringent and other remedies, become inadequate to check the exhausted progress of the complaint, and the unfortunate sufferer must soon perish, unless some decisive means be devised for her relief. In this painful extremity, the extirpation of the uterus itself has been proposed as the most efficient means of relief, and formidable as the operation at first view seems, it is known to have been already performed with success." *Windsor, in Med. Chir. Trans. Vol.* 10, *p.* 361—63.)

One of the most afflicting consequences of an inversion of the uterus, is so considerable an inflammation of the part, as to induce a danger of its mortifying. In this circumstance, the extirpation of the uterus has been also suggested, and even practised; an operation that has had but little success, the majority of patients on whom it has been practised under such circumstances having died.

The practice of extirpating the inverted uterus, through apprehension of the part mortifying, cannot be too strongly reprobated; for unless mortification has really happened, the uterus may possibly be brought into a state again, in which the inconveniences arising from its inversion would be very supportable, and the operation altogether avoided. Even supposing mortification were to take place, the indication would be to appease the bad symptoms, and promote the separation of the sloughs by suitable applications, without doing any injury to the living parts. One example, in which the latter practice was successfully adopted, is recorded by Rousset. That the extirpation of the uterus, when this organ is completely or incompletely inverted, totally irreducible, and attended with the sufferings and reduced health, so well described by Mr. Windsor, may sometimes be adviseable, cannot now be doubted. The unequivocal examples on record of the removal of the cancerous uterus by Osiander, Dupuytren, Langenbeck, and others, and the cases, published by Mr. Newnham and Mr. Windsor, where the inverted and irreducible uterus was successfully extirpated, furnish sufficient evidence in favour of the practice without referring to numerous other cases reported on older authorities, the correctness of some of which may be questionable.

In fact, polypi, growing from the uterus, frequently attain so considerable a size, that they protrude out of the vagina, and are occasionally mistaken for the uterus itself. The surgeon extirpates the tumour with a ligature; the operation does not undeceive him about the nature of the part; his patient has a favourable recovery; and the case is published as an instance of the successful extirpation of the uterus itself.

Although it is easy to distinguish the inversion of the uterus, which happens soon after delivery, it is not so to make out the nature of such cases, as happen in other circumstances, notwithstanding the presence of the same kind of symptoms. As cases of the latter kind are uncommon, and, consequently, not expected, mistakes are the more liable to be made. A polypus has often been mistaken for an inversion of the uterus, but, it should be recollected, that the upper part of a polypus is always narrow; and the tumour, which is not very sensible, is irreducible; whereas, the uterus, in a state of incomplete inversion, forms a semi-spherical swelling, sometimes a little oblong, but always broader above than below. It is very sensible, and may generally be reduced. And, when the inversion is complete, the tumour has a greater resemblance to a polypus, inasmuch as it seems to have a pedicle, but the impossibility of introducing a probe far at the circumference of such pedicle, as can be done in cases of polypi, will generally serve at once as a criterion of the nature of the disease.

The greatest obscurity in the diagnosis is said to prevail when the inversion is partial and chronic, because the os uteri then encircles the summit of the tumour, just as it does a polypus, and, in both cases, the finger will pass all round between the parts. (See *Newnham's Essay on Inversio Uteri, with a History of the successful Extirpation of that Organ, p.* 82, 8*vo. Lond.* 1818.) However, as I do not believe with this gentleman, that the neck of the polypus is frequently as large, and sometimes larger, than its inferior portion, I should yet expect that the difference in the form of the two swellings, perceptible on manual examination, would here be an important criterion. In general, also, the fact, that inversion of the uterus first happens, at or soon after delivery, is a consideration, that would tend to a right discrimination of the cases, inasmuch as the first protrusion of a polypus directly after delivery, is rare, and, when it does happen, under these circumstances, is probably always complete, and not partial.

Reduction is the only plan, whether the case has arisen from the weight of a polypus or from uterine hemorrhage. However, this proceeding is generally useless, when the disease originates from obesity. In the latter case, as the cause still continues in full force, the uterus is soon displaced again, and a pessary is the only means to which the patient can resort.

Having delivered many additional observations on the subject of inversion of the womb, in the 2d vol. of the First Lines of Surgery, Ed. 4, I shall here conclude with referring to some works, in which the reader will find valuable instruction on the subject. *F. B. Wachler, de Prolapsu et Inversione Uteri, Halæ,* 1745. *Act. Naturæ Cur. Vol.* 6, *Obs.* 107, *uterus feliciter extirpatus. Nauche, des Maladies de l'Uterus,* 8*vo. Paris,* 1816. *Osiander, Neue Denkwürdigkeiten,* 1 *B. p.* 307. *Sabatier, Médecine Opératoire, T.* 2. *Dict. des Sciences Méd. T.* 23, *p.* 287. *W. Newnham, on the Symptoms, Causes, and Treatment of Inversio Uteri, with a History of the successful Extirpation of that Organ, during the Chronic Stage of the Disease,* 8*vo. Lond.* 1818. *J. Windsor, Obs. on Inversion of the Uterus, with a Case of successful Extirpation of that Organ, Med. Chir. Trans. Vol.* 10, *p.* 358. *&c. Denman's Plates of a Polypus, with an Inversion of the Uterus,* 1801. *Dr. Baillie's Series of Engravings, &c. Fasc.* 9, *Tab.* 5. *Cleghorn, in Med. Communications, Vol.* 2: *a chronic* *case.* *E. B. Herzog de Inversione Uteri, 4to. Wirceb.* 1817.

UTERUS, POLYPI OF. (See *Polypus.*)

UTERUS, PROLAPSUS OF. The womb, situated in the upper and middle part of the pelvis, is but imperfectly secured in its natural place by means of its broad and round ligaments. Hence it sometimes descends into the lesser cavity of the pelvis, so as to pass more or less down the vagina, or even protrude beyond the labia. The first case is the *incomplete ;* the second, the *complete* prolapsus uteri.

In the first form of the disease, where the uterus has not passed down so low as to protrude externally, some of the complaints which the patient experiences depend upon the pressure of the displaced viscus upon the parts unaccustomed to it, particularly the bladder and rectum ; while other inconveniences arise from the tension of the ligaments, destined to retain the organ in its natural position. These last grievances are chiefly a sense of heaviness in the pelvis, and a dragging pain in the loins ; symptoms which are aggravated when the patient sits up, or walks about ; but diminish when she remains in bed, though as the disease, when neglected, scarcely ever fails to grow worse, they rarely subside altogether. However, such amendment actually sometimes happens in consequence of the parts becoming gradually habituated to their change of situation. When the disease comes on with great suddenness, the symptoms are remarked to be much more severe than when it takes place slowly. In the first case, long-continued syncope, pain over the whole abdomen, tenesmus, uterine hemorrhage, inflammation of the peritonæum, and severe febrile symptoms may be excited.

With regard to the effects, caused by the pressure of the tumour on the bladder and rectum, they consist of more or less difficulty in voiding the urine and feces. The dysury and constipation increase in proportion as the patient continues in an upright posture, and the uterus descends nearer to the inferior orifice of the vagina. Sometimes the irritation brings on a considerable mucous discharge, which, when the patient suffers little other inconvenience from the prolapsus, is apt to be mistaken for fluor albus, or gonorrhœa.

A woman may become pregnant, notwithstanding an incomplete prolapsus of the womb. The displacement may even take place at a more or less advanced period of gestation, (*Portal des Accouchemens*) while, in other still more uncommon instances, the prolapsus has been remarked to disappear when the period of labour drew near. Cases exemplifying both these facts, are related by Loder, (*Journ. für die Chir. B.* 2, *p.* 13,) by Saviard, Portal, (*Mém. de l'Acad. de Chir. T.* 3,) in the Journ. de Médecine, T. 45 ; and by Chopart. (*Traité des Maladies des Voies Urinaires.*) A prolapsus uteri may also happen during parturition. (*Garin, Journ. de Méd. continué, T.* 4, *p.* 265 ; *Ducreux, Mém. de l'Acad. de Chir. T.* 8, *p.* 393.)

When, in the course of time, a prolapsus uteri changes from the incomplete to the complete state, all the inconveniences depending upon the pressure of the part upon the rectum and bladder subside : that is to say, the feces and urine are now freely voided. But, on the other hand, the symptoms arising from the stretching of the peritonæum become considerably worse. The uterus drags down with it the vagina, which becomes doubled on itself, and a part of the bladder, connected with the upper part of the latter tube, is also drawn down. Some of the abdominal viscera may even fall into the cul-de-sac, formed by the vagina, and considerably increase the size of the tumour. The swelling, protruding between the thighs, is of an oblong, nearly cylindrical form, and terminates below in a narrow extremity, in which a transverse opening, the os tincæ, may be discerned, from which the menses are discharged at the periods prescribed by nature. However, the cylindrical shape of the tumour may lead to mistakes, for the vagina, being doubled on itself, and exposed to the effects of the air, sometimes looks like skin. Hence women, thus afflicted, have occasionally been supposed to be hermaphrodites, the tumour being mistaken for a penis. Such a case is recorded by Saviard.

The patient is generally troubled with tenesmus, and sometimes feels acute pain in the tumour itself, which is subject to inflame and ulcerate, in consequence of its depending posture, the friction to which it is exposed, and the irritation of the urine.

The direction both of the bladder and the urethra becomes horizontal, so that the urine is thrown forwards, or even upwards, in which latter case it wets the abdomen. Frequently the bladder cannot be emptied without the assistance of the catheter ; and sometimes the displaced uterus becomes affected with inflammation and swelling. In many cases there are profuse hemorrhages. However, some women become so habituated to the disease that they hardly seem to experience any annoyance from it : whenever they are in the erect posture, and walk about, the womb falls down, bringing with it the vagina ; and, as soon as they lie down on their backs, the parts as readily return into their natural position again.

The incomplete prolapsus is alone subject to any obscurity, which, however, may be dispelled by manual examination. In this, however, some precautions are necessary. For instance, as the womb generally returns into its natural situation when the patient lies down, the examination should always be made as she is standing up. For the same reason, if she is in the habit of lying long in bed, the morning is not the best period of the day for the examination. The practitioner may also be deceived if he examine the parts when the rectum and bladder are distended with their contents, in which state the uterus may be hindered from descending as low as at other periods.

If attention be paid to these circumstances, an incomplete prolapsus may always be distinguished without risk of error. However, the records of surgery prove that the case has sometimes been mistaken by the inexperienced, or ignorant, for a polypus, and the part extirpated under this supposition. So serious a blunder will be avoided, if care be taken to remember that polypi are generally softer and less sensible than the uterus; that, in a case of prolapsus, the os tincæ is situated at the lower part of the swelling; and, that if by chance any resembling aperture should be met with upon the corresponding portion of a polypus, the prolapsus may still be known by the greater depth to which a probe will enter such opening. A polypus of the uterus, I believe, is always broadest at that extremity, which is nearest the vulva; but the womb, in a state of incomplete prolapsus, forms a tumour which is narrower below than above. With very few exceptions, the womb is likewise reducible, and the patient directly afterward feels great relief; whereas a polypus cannot be pushed back, and the attempt, instead of giving relief, only increases the patient's sufferings.

In a complete prolapsus, no doubt can ever prevail about the real nature of the case, for whatever uncertainty the feel of the parts may create, none can ever remain when the swelling is distinctly visible.

Although Mauriceau, Saviard, and Monro have recorded instances of prolapsus uteri in maidens, such cases are exceedingly rare. The disease is hardly ever met with, except in women who have had children, and generally in those who have borne a great many. This particularity is ascribed by writers to the elongation of the ligaments of the uterus in women, in whom this organ has been repeatedly gravid. The same consideration may also account for the frequency of prolapsus uteri during the first months subsequent to parturition, especially as the womb remains for some time after labour more enlarged and heavy than natural. The disease is more common in thin than fat women, and is said often to take place in females when they suddenly change from a fat to a very emaciated state. The displacement is facilitated by a capacious vagina, by a great width of the lesser cavity of the pelvis, and the effects of tedious and profuse attacks of fluor albus. Prolapsus uteri has also been brought on by violent concussions of the body; the protracted efforts of vomiting, coughing, or crying, hard labour, and lifting, or carrying heavy burdens. In what has been stated, one may discern the reason why the affliction is so frequent among the lower classes of society, and why women, for a certain time after parturition, should avoid an erect posture, and every kind of exertion. In the treatment of prolapsus uteri, there are two indications; the first is to reduce the part; and the second is to keep it from falling down again.

In the incomplete prolapsus, the first indication is very easy of accomplishment; and, indeed, when the patient is placed on her back, with her pelvis raised somewhat higher than her chest, the uterus often returns of itself into its natural situation again. At all events, the reduction may be immediately effected by pushing the uterus up into the pelvis with the fingers.

More difficulty generally attends the reduction of a complete prolapsus. Here the same posture is to be chosen as in the former case; but the legs and thighs should be bent. The rectum should also be first emptied with clysters. Sometimes, indeed, every attempt at reduction fails, notwithstanding the adoption of the most vigorous measures, the use of the warm bath, purgatives, venesection, low diet, fomentations, &c. Occasionally the part is returned after a great deal of trouble; but, owing to the long altered state of parts, the reduction brings on worse symptoms than resulted from the continuance of the prolapsus. Such a case is recorded by Richter. (*Bibl. der. Chir. B.* 3, *p.* 141.) The patient's sufferings were so much increased by the reduction, and so obstinate a constipation came on, that it became absolutely necessary to let the uterus descend again. In any irreducible case, all that can be done is to support the swelling, and prevent its increase with a suspensory bandage, and draw off the urine with a catheter whenever requisite. In these cases, the altered course of the meatus urinarius is to be remembered, and the catheter directed horizontally towards the rectum.

When the displaced uterus is inflamed, and considerably swelled, the attempt at reduction should be preceded by antiphlogistic remedies, the patient should be kept in bed, be put on a low regimen, be bled, take purgative medicines, use the warm bath, and drink diluent beverages, while emollient applications are made to the part itself. This plan of treatment has often been attended with complete success, in cases of prolapsus uteri, of long standing and considerable size. Ruysch disapproved of making any attempt to reduce the uterus while it was inflamed and swelled. He also thought that the operation should be postponed when the uterus was in an ulcerated state. However, Sabatier rightly observes, that, as this complication is only accidental, and merely arises from the friction to which the tumour is exposed, and the irritation of the urine, the plan of immediately replacing the part cannot be attended with any danger. On the contrary, since the cause which produces and keeps up the ulceration will cease, as soon as the reduction is accomplished, the sores will heal after the uterus is put into its natural situation again.

When a prolapsus uteri occurs in the early stage of pregnancy, this state should not let the practitioner neglect to reduce the part. Several instances are recorded, in which the reduction was successfully accomplished in pregnant women; and one case of this kind is reported by Giraud. (*Journ. de Médecine, T.* 45.) When pregnancy is far advanced, or the disease is of long standing, the reduction is difficult. Perhaps, says Sabatier, it may be more prudent, in these circumstances, to let the uterus continue protruded, than to disturb the mother and fœtus with reiterated attempts to reduce the part. The uterus, however, should not be left to itself, but be well supported with a suitable bandage, and the patient kept in bed. When the prolapsus uteri occurs at the period of delivery, every attempt at reduction is both useless and dangerous. In this case, the delivery of the fœtus should be expedited by gradually dilating the os tincæ, which, at the same time, should be carefully supported. The extraction of the placenta also requires a great deal of caution, and it should be accomplished by introducing one hand into the uterus, with the palm turned away from the cavity of this viscus, towards the outside of the placenta, which is to be gradually separated from its edges towards its centre.

In cases of complete prolapsus uteri, Ruysch was an advocate for leaving the expulsion of the fœtus, if alive, to be effected by nature; and the same writer advises us to be content with supporting the os tincæ. But when the child is dead, he recommends extracting it with one hand, while the uterus is supported with the other. Sabatier, however, entertains different sentiments. The expulsion of the child, he says, is not less the effect of the contraction of the diaphragm and abdominal muscles, than of the womb itself. Hence, when either of these agents fails to co-operate, the delivery becomes either very difficult, or impossible. This is exactly what happens in the present case; for the uterus having fallen down, cannot be compressed by the diaphragm and abdominal muscles. Nor can Sabatier discern the reason why Ruysch should recommend the line of conduct to differ, according to the different state of the child. This is quite passive in parturition, and contributes not in the least to its own expulsion.

The second indication, or that of keeping the uterus reduced, demands the employment of astringent injections and pessaries.

The uterus, in a state of prolapsus, is sometimes also affected with scirrhus and cancer. A case of this description was met with by Ruysch; and, very recently, a woman whose uterus was cancerous, and in a state of complete prolapsus, without any inversion, was attended by Langenbeck, who succeeded in removing the diseased organ with a knife, and the patient recovered. According to this author's description, after the vagina had been separated from the uterus, the latter organ was detached from the peritoneum, without the latter membrane being opened, a small portion of the fundus uteri being left, however, as it appeared quite sound. The bleeding was very profuse, and required the use of the needle and ligatures. The ovaries and divided ligamenta rotunda were found connected with the removed portion of the uterus. (*Bibl. für die Chir. B.* 1, *p.* 551, *12mo. Hannover*, 1818. *Saviard, Observ. Chir.* 12*mo. Paris*, 1702. *J. G. Preund, De Novo artificio curandi procidentiam Uteri, Francof. ad Viadn.* 1710. *Levret, in Journ. de Méd. T.* 40, *et Obs. sur la Cure Radicale des plusieurs Polypes, &c. Morgagni, de Sedibus et Causis Morborum, Epist.* 45. *Kulmus, de Uteri Delapsu, Suppressionis Urinæ, et subsequentis Mortis Causa, Gedani,* 1732. *White, in Med. Obs. and Inq. Vol.* 2. *Shaw, in Mem. of the Medical Society of London, Vol.* 1. *Portal, Cours d'Anatomie Med. T.* 5, *p.* 538, *et Mém. de l'Acad. de Chir. T.* 3. *Sabatier, in Mém. de l'Acad. de Chir. T.* 3, *p.* 361, *and Médecine Operatoire, T.* 2. *Ducreux, in Mém. de l'Acad. de Chir. T.* 8, *p.* 493. *Osiander, Annalen, B.* 1, *p.* 175. *Dict. des Sciences Méd. T.* 23, *art. Hysteroptose.*

UTERUS, RETROVERSION OF. Retroversion of the uterus is said to happen, when its fundus is forced downward and backwards between the sacrum and the posterior part of the vagina, while its cervix inclines towards the symphysis pubis. The ancients are thought to have had some imperfect notions of this case, and, in proof of this opinion, certain passages are referred to in Œtius, (*Tetrab.* 4, *Serm.* 4, *C.* 77.) Mercurialis, Mercatus, and others, (See *Dict. des Sciences Méd. T.* 23, *p.* 273.) Be this as it may, it is generally confessed, that the subject had fallen into oblivion, when Dr. Wm. Hunter called the attention of his pupils to the subject, in 1754, and afterward drew up an interesting paper concerning it. (*Med. Obs. and Inquiries, Vol.* 4, 8*vo. Lond.* 1771.) Subsequently, the knowledge of the subject was extended by the observations of Wlzezeck, (*De Utero retroflexo, Prag.* 1777,) the remarks of Richter, (*Chir. Bibl. B.* 5, *p.* 521, *& B.* 9, *p.* 182.) and those of Wall, (*Diss. de Uteri retroversione, Hal.* 1782,) and by the memoir of Desgranges, to which the prize of the Royal Academy of Surgery at Paris was adjudged, in the year 1785. According to Sabatier, retroversion of the womb was a case mentioned by Gregoire in his private lectures on midwifery at Paris.

Walter Wall, an English surgeon, who had attended Gregoire, suspected that he had met with a retroversio uteri in a woman, some months advanced in pregnancy, and he called in Dr. Hunter, in order to have the advantage of his advice. The woman was attacked with an obstinate constipation, and retention of urine, and died in about a week. A large tumour was found occupying the whole of the pelvis, and pushing the vagina against the os pubis. It had been found impracticable to push the swelling back into the abdomen, although the patient had been put on her knees and elbows, while one hand had been introduced into the vagina, and two fingers of the other hand into the rectum. Great curiosity existed about what information would be afforded by dissection. On opening the body, the bladder, which was exceedingly full of urine, filled almost the whole anterior part of the abdomen, in the same manner as the uterus does in the last month of pregnancy. When it had been emptied, that part of it, in which the ureters terminate, and which is connected with the vagina and cervix uteri, was found raised up, as high as the upper aperture of the pelvis, by a large tumour, which filled the whole cavity of the pelvis, and was found to be the uterus. A catheter, when passed into the vagina, could be made to lift up the latter viscus and the upper part of the tumour. This portion of the swelling, on which the bladder lay, consisted of the cervix uteri, while the fundus of this organ was situated downwards toward the os coccygis and anus. The uterus was so large that it could not be taken out of the pelvis, before the symphysis pubis was divided, and the two ossa innominata were pulled asunder It was found impossible to assign any cause for the displacement of the uterus, as the patient had been making no exertion, and had met with no fall, though she is said to have been frightened at something just before the complaint commenced.

Dr. Hunter, struck with the singular nature of the case, thought it deserving of the attention of medical men, and he made it the subject of a lecture which he delivered in 1754. He was afterward consulted by several persons, who were afflicted with the retroversio uteri; but, not in so acute a way, as in the above instance. All the patients were in the third month of pregnancy and first suffered a difficulty of making water, succeeded by retention of urine, and afterward by constipation. Dr. Hunter always emptied the bladder by means of a catheter and glysters, which measures sometimes effected a cure, the uterus spontaneously resuming its natural position. In every instance, the accident disappeared, when pregnancy was more advanced, and the uterus had acquired larger dimensions. In some cases, in which Dr. Hunter was consulted too late, the trials to replace the uterus proved fruitless, and the women died. Dr. Hunter was so firmly convinced of the impossibility of saving patients circumscribed in the above manner, unless extraordinary means were resorted to, that he thought one should endeavour to diminish the size of the uterus, by introducing a trocar into the body of this viscus, through the posterior parietes of the vagina, so as to let out the water of the amnios, the relative quantity of which is known to be greater in the early, than in the advanced stage of pregnancy. (See *Jourel in Bulletin de la Faculté de Méd. p.* 173, *an.* (1812.)

Such a puncture might certainly be the means of the uterus resuming its natural position; but there would be considerable danger of its exciting the contraction of the uterus, and causing abortion. No risk of this kind would be encountered by puncturing the bladder above the pubes. In this manner, a free passage would be afforded for the escape of the urine, and the reduction of the uterus might be effected.

Mr. Lynn, a surgeon in Suffolk, knew an instance of the bladder bursting, and the urine becoming extravasated in the abdomen, in a case of retroversion of the uterus, in consequence of the patient's refusal to submit to the preceding operation. The woman was forty years of age, of a relaxed habit, mother of several children, and had been pregnant four months. She had also been for sometime afflicted with a prolapsus of the vagina. The swelling had been a few days reduced, when in consequence of tripping, she felt something become displaced in her abdomen, and fall toward the lower part of her back. She was immediately attacked with constipation, retention of urine, nausea, and pain in her belly. The means which were employed, not proving effectual, Mr. Lynn suspected a retroversio uteri, and introduced his fingers into the vagina, in order to ascertain the fact. His fingers were stopped by a tumour, as large as a child's head. The swelling occupied the back part of this passage, and descended as low as the perinæum. Being certain, that the uterus was displaced, he attempted to reduce it. The patient was put into various positions, and the fingers of one hand were introduced into the vagina, while those of the other were passed into the rectum. The use of the catheter was not forgotten; but it could not be introduced far enough to reach the urine. Glysters were stopped at the very beginning of the rectum. The abdomen was exceedingly tense, especially in the hypogastric region. A proposal was made to puncture the bladder; but the patient refused to submit, and preferred being left to her fate. On the seventh day of her illness, she was very much reduced; and became affected with nausea, and hiccough, the forerunners of mortification. At length, she felt something give way in her abdomen, and the ease, which succeeded, revived her hopes. These, however, were not of long duration, for, after being delivered, she sunk, and died the next morning. On opening the body, the bladder was found to have sloughed, and burst at several points, and two parts of urine were consequently extravasated in the abdomen.

Retroversio uteri is a dangerous affection; but it is not invariably fatal, particularly when the patient receives succour, before the disorder has made much progress. Though Callisen met with a case after delivery, and Desault knew an instance in which the displacement was produced by a polypus, retroversio uteri scarcely ever occurs, except in the early months of pregnancy, and in women whose pelvis is very wide, while its brim is very contracted. If the uterus, in a pelvis of this conformation, be pushed back by a distended bladder, and pressed against the sacrum, while the soft parts yield, the womb becomes, as it were, wedged, and is incapable of changing its position. In this immoveable state, it presses upon the surrounding parts, and these upon it, so that a very serious train of bad symptoms are the consequence.

The first care of a practitioner, consulted in a case of retroversio uteri, should be to empty the bladder and large intestines, and to relax the parts by every possible means. Then he should immediately proceed to replace the uterus, by placing the patient in a suitable posture, and making methodical pressure in the rectum and vagina. Should he be so fortunate as to succeed, the patient is to be confined in bed, her bowels are to be kept open, and she is to be advised always to obey the calls of nature the first moment she feels any inclination to make water. She is also to be enjoined to avoid all kinds of exertion, and wait till the gradual enlargement of the uterus removes the possibility of this viscus descending into the pelvis. (*Sabatier, Médecine Opératoire, T. 2.*)

Some practitioners, of considerable eminence, rather discourage the manual interference to reduce the uterus, believing that drawing off the urine will generally render such interference unnecessary. (*Croft, in Lond. Med. Journ. Vol.* 9, *p.* 53. *Denman's Introduction to Midwifery.* 4*to. Lond.* 1801. *S. Merriman, on Retroversion of the Womb,* 8*vo. Lond.* 1810.)

(See *Lynn, W. Hunter, Garthshore, Bird, and Hooper, in Med. Obs. and Inq. Vols.* 4, 5, *and* 6. *Cheston and Cleghorn, in Med. Communications, Vol.* 2. *John Clarke, Practical Essays on the Management of Pregnancy and Labour, Lond.* 1793. *Murray, in Uteri Retroversionem Animadversiones, Upsal.* 1797. *Denman's Introduction to Midwifery, Lond.* 1810. *S. Merriman, on Retroversion of the Womb, &c.* 8*vo. Lond.* 1810. *John, De Utero Retroverso, Jen.* 1 87. *Desgranges, in Journ. de Méd. T.* 66, *p.* 85. *Klein, Chir. Bemerkungen, p.* 235. *Baudelocque sur le Renversement de la Matrice, &c. Paris,* 1803. *Cockell, Essay on Retroversion of the Uterus, Lond.* 1785. *Richter, Chir. Bibl. B.* 4, *p.* 61,—70—235—555 ; *B.* 5, *p.* 132—548 ; *B.* 7, *p.* 292 ; *B.* 8, *p.* 715 ; *B.* 9, *p.* 182 ; *B.* 11, *p.* 310—328 ; *B.* 12, *p.* 45—50.)

UVA URSI, which was first brought into notice by De Haen, was once considered a powerful remedy in calculus ; but though its virtue in lessening the irritation of the bladder, is still acknowledged, its claim to utility on any other principle, is quite rejected. Dr. Austin recommended it for lessening the irritability of the bladder, and diminishing the secretion of diseased mucus, which, he supposed, greatly contributed to the augmentation of the stone.

Mr. B. Bell also strongly recommended it in gonorrhœa, where the irritability of the bladder was excited in a high degree, and where the urine was loaded with viscid matter. In these cases, he directed a scruple, or half a dram of the powder, three times a day.

Dr. Saunders orders three drams of uva ursi to be macerated in a pint of hot water, and two or three ounces of the strained liquor to be given three times a day. (*Pharm. Chirurg.*)

UVULA, AMPUTATION OF. The uvula is subject to several kinds of enlargement, in which it becomes both longer and more bulky than natural, or is simply lengthened. In consequence of such changes, it becomes troublesome in deglutition and speaking, and causes a disagreeable tickling at the root of the tongue, frequent retchings, and an annoying cough.

When things have attained this state, medicines are often ineffectual, and the only plan of relief consists in amputating a portion of the uvula.

The ancients used to take hold of the uvula with a pair of forceps, and cut off a piece of it below the blades of the instrument. Fabricius ab Aquapendente objected to this method, because it employed both hands, and a third was needed for holding the tongue and lower jaw. He preferred scissors, and having the left hand at liberty.

When the size of the uvula was considerable, and bleeding apprehended, Paré recommended the application of a ligature to the part, by means of an instrument, composed of a ring, mounted on a slender handle, and formed with a groove upon its convexity. A ligature is put round the ring with a slip-knot, which is to be tightened by means of another ring, of much smaller size, mounted like the preceding one, upon a long slender handle. The ligature is to be left in the mouth, and when it does not make sufficient constriction, it is to be tightened.

Fabricius Hildanus subsequently described an instrument constructed on the same principles. Sabatier takes hold of the uvula with a pair of forceps, made with holes in the blades, like those used for the extraction of polypi. He then divides the uvula with a pair of scissors, made with concave cutting edges.

Sabatier never saw any bleeding of consequence follow this trivial operation. (See *Médecine Opératoire, T.* 3.)

V.

VAGINA IMPERFORATE. Female infants are often born with different imperforations of the vagina. Sometimes this passage is not completely shut up, so that the usual evacuations happen in an uninterrupted manner, and it is a considerable time before the malformation is discovered. Some females are even stated to have become pregnant, notwithstanding such obstruction ; and in these cases the membrane which shut up a part of the mouth of the vagina, either was torn by the effects of labour, or divided as much as was necessary for delivery.

Two membranes, one placed beyond the other, and obstructing the vagina, have also been found. That which is commonly met with is only the hymen, thicker and stronger than natural. Ruysch describes the case of a woman who had been in labour three days, and could not be delivered. The head presented itself, but was prevented from coming out by the hymen, which shut up the vagina, and was very tense. Ruysch made an incision into the membrane; but to no purpose, since there was another membrane, of a thicker texture, situated more deeply in the passage. As soon as this second membrane was divided, the child was expelled, and the case ended well.

When the vagina is completely imperforate, and the time of the menses commence, many complaints occur, which afflict the patient with more severity, in proportion as the blood accumulates in the passage, and they may even lead to a fatal termination when the cause is not understood, or not detected till it is too late. These complaints are very similar to those of pregnancy; for instance, rumbling noises in the bowels, loss of appetite, nausea, vomiting, enlargement of the mammæ, spasms, convulsions, swelling of the abdomen, &c. Hence, girls in this situation have often been supposed to be pregnant, although they were not in a state even to become so; and some young women have been known to die, after dreadful sufferings.

When the malformation consists altogether in the orifice of the vagina being shut up by a membrane, the patient may be easily relieved by a crucial incision, or a single cut, the edges of which are kept apart by a tent of suitable shape and size. Instances of the success of such an operation are to be found in numerous writers. Fabricius ab Aquapendente informs us, that a female child was born with a membrane which completely shut up the vagina. The girl experienced no inconvenience from it till she was about thirteen, when the period of her menses began. As the blood was retained, she became afflicted with severe pains in the loins, the lower part of the abdomen, and about the upper part of the thighs. She was supposed to be attacked with sciatica, and treated accordingly. Medicines were prescribed which did no good; and at length she became hectic, and reduced to a complete state of marasmus, in which she passed restless nights, lost her appetite, and was delirious. A painful, very elastic tumour afterward presented itself in that part of the abdomen which corresponds to the uterus. The pains were aggravated every month, at the period when the patient ought to have menstruated. She was in a dying condition when Fabricius ab Aquapendente was consulted, who, after ascertaining the real nature of the case, performed the requisite operation. A prodigious quantity of black putrid blood was discharged from the vagina; the bad symptoms gradually subsided, and the patient recovered. (See also *J. C. Loder, Obs. Imperforationis Vaginæ, Icone illustrata, 4to. Jenæ,* 1800; *and numerous other cases on record.*)

When the malformation is produced by an extensive accretion of the sides of this passage to each other, the cure is sometimes difficult. The result of the operation is doubtful, because it is impossible to reach the situation of the blood without cutting through a considerable thickness of parts, in doing which there is some danger of wounding the rectum, or bladder. A lady, twenty-four years of age, after having tried, for eight years, such remedies as seemed best calculated for exciting the menstrual discharge, became affected with a large hard swelling of the abdomen, and a kind of herpetic affection round the body near the navel. At length it was discovered, that the imperforation of the vagina was the sole cause of all the bad symptoms which the patient had long endured. An incision was made, which enabled the operator to introduce his finger into a large cavity, and which gave vent to a considerable quantity of blood. It was thought that an opening had been made into the vagina; but the patient having died three days afterward, it was seen that a mistake had been made, as the cavity, in which the finger had been introduced, was that of the bladder. The vagina was closed below by a substance of an inch in diameter, and half an inch thick. The upper part of this passage, the uterus, and the Fallopian tubes, were exceedingly enlarged, and filled with a dark brown, sanious fluid. A similar fluid was extravasated in the abdomen, and it was discovered to have passed there through a rupture which had taken place in the Fallopian tube. The ovaries were in a natural state. De Haen, who has related this case in the sixth part of his work, entitled *Ratio Medendi*, was of opinion, that in order to avoid opening the rectum, or bladder, only one oblique cut should be made in the membrane which stops up the vagina, just as was advised by Méeckren. (*Sabatier de la Médecine Opératoire, T.* 1.)

VAGINA, PROLAPSUS, OR INVERSION OF. According to Sabatier and Levret, the displaced part does not consist of all the coats of the vagina, in the same manner as the inverted uterus is formed of the whole substance of this viscus. These writers contend that the lining of the vagina is alone displaced, in consequence of the swelling and thickening with which it is affected. Upon this point, however, Richter does not accede to the opinion of Sabatier and Levret, but describes the vagina as being liable to two kinds of prolapsus. In one case, all its tunics are stated to be included in the protrusion, the part becoming inverted at the same time that it falls down. In the other example, it is only the relaxed lining of the vagina which descends, and makes the protrusion.

The possibility of a prolapsus of the whole of the vagina, together with all its coats, says Richter, has been doubted by Sabatier and Levret; but without any real foundation. If it be possible for the inner coat of the vagina to separate from the external, with which it is intimately connected, (an event which every body admits as happening in the second kind of prolapsus of the vagina,) why, asks Richter, should it be impossible for the whole of this tube, together with all its coats, to be separated from the surrounding parts, to which it is less closely adherent? Sometimes the rectum, inclusive of all its coats, forms what is termed a *prolapsus ani*, and why may not the vagina be displaced in a similar manner, since it must be much more liable than the rectum to be propelled downwards in the violent straining at the time of delivery? Richter asks, whether every prolapsus uteri is not accompanied with such a displacement of the vagina? Cases are upon record, where the prolapsus of the vagina happened all on a sudden, in consequence of falls, the starting of a horse, &c. (*Hoin, Levret, Journ. de Méd. T.* 40.) Here it cannot be supposed, that the case was merely a protrusion of the inner coat, which can only be gradually relaxed and elongated. Lastly, some instances, in which the prolapsus of the vagina was several inches in length, have been gradually reduced by means of external pressure. (*Hoin.*) How can it be imagined, says Richter, that such cases could proceed from any degree of relaxation to which the membranous lining of the vagina is liable?

Richter acknowledges, however, that a prolapsus of all the coats of the vagina is much less common than that arising from relaxation of the membranous lining of this passage; he states, that when it occurs, it is generally a consequence of a prolapsus of the uterus; and that it cannot easily happen at all, except about the period of delivery. (See *Anfangsgr. der Wundarzn. B.* 7, *Kapitel* 4.)

According to Sabatier, the prolapsus, or inversion of the vagina, appears like a thick, circular substance, irregularly plaited in the middle, and at the bottom of which the cervix uteri is situated, having descended further down than natural. The displaced portion of the vagina increases, or diminishes, according as the patient sits up, or keeps in bed a certain time. The complaint is accompanied with a sense of heaviness in the hypogastric region; tenesmus; and a difficulty of making water, in consequence of the alteration produced in the direction of the meatus urinarius.

Such is the prolapsus of the vagina in an early state; but when it has been of long standing, and the patients have remained for a long while without any assistance, the membranous lining of the passage becomes more and more thickened; and the tumour, which it forms, becomes more considerable, elongated, and hardened. In this state there still continues, at the lower part of the swelling, an opening, out of which the usual evacuations are made. The grievances suffered are similar to those arising from a prolapsus uteri, to which, indeed, the present case bears a great resemblance. The prolapsus vaginæ, however, differs, inasmuch as the tumour formed by a descent of the uterus is very firm, and terminates in a narrow end, where may be observed the oblong transverse opening, named the os tincæ; while the tumour, arising from a prolapsus of the vagina, is soft, thicker below than elsewhere, and ends in an irregular aperture.

Occasionally, a prolapsus of a very limited portion of the vagina is observed. This case is generally the consequence of an uncommon sort of rupture, termed the *vaginal hernia* (see *Hernia*;) but it should also be known, that in some cases of dropsy, a circumscribed protrusion of the vagina, in the form of a cyst, or pouch, filled with fluid, is sometimes noticed. (*Richter, Op. et loco citato.*)

When the prolapsus vaginæ is recent, the part may be easily reduced, and kept up with a pessary. The use of astringent lotions will also tend to prevent a relapse. But when the case has been of long standing, it is neither easy to effect the reduction, nor to prevent a recurrence of the disorder. Softening, relaxing remedies, in this circumstance, are recommended, and the patient should, in particular, confine herself to her bed, and wear a T bandage, which should be made to press upon, and support a piece of sponge in the orifice of the vagina.

It is reasonable to expect, that after a prolapsus vaginæ has continued a long while, the reduction must be difficult; because the vagina in this state becomes affected with swelling and induration. According to the reports of Hoin and Levret, a large protrusion of this kind, ten inches in length, was so diminished by keeping the patient invariably confined in bed upon her back, that in the course of a month, the rest of the tumour admitted of being reduced. Indeed, as Richter observes, there can be little doubt, that the treatment which has been advised by some authors, for the diminution of very old, enormous, omental ruptures, would here be equally applicable; viz. long confinement in bed upon the back, with the buttocks somewhat elevated; unremitting, well directed external pressure; a very low diet; and repeated mercurial purges.

During pregnancy, a prolapsus of the whole substance of the vagina may cause much embarrassment and even danger. In one case of this description, where the protrusion was five inches in length, it became necessary to turn the child, and the displaced vagina was lacerated. The woman, however, recovered. (*Pietsch, Journal de Méd. T.* 34.) In another instance, where the prolapsus became, at each return of the labour-pains, as large as a man's head, the practitioner succeeded in holding the parts back, while delivery was effected with the aid of the forceps. (See *Loder's Journ.* 1 *B. p.* 490.) When this is impracticable, it is necessary, according to Richter, to make an incision through both sides of the prolapsus; a measure, says he, to which the practitioner may the more readily make up his mind, inasmuch as the parts have, in some cases, been lacerated, without any ill consequences.

A prolapsus of the inner membrane of the vagina, while small and recent, might perhaps be removed by astringent applications. When, however, it is of long standing, indurated, and of large size, much expectation of success from this treatment cannot be entertained. Richter sees no reason why, in such a case, the superfluous relaxed part should not be cut away, especially if the disease be accompanied with ulceration, and other serious complaints. As he observes, there can be no doubt, that a prolapsus of the inner membrane of the vagina, when limited to one part of this canal, may always be safely extirpated, either with a knife, or a ligature. (*Anfangsgr. der Wundarzn. B.* 7, *Chap.* 4.)

As the swelling of the membranous lining of this passage is folded back on itself, it sometimes increases in such a degree, that the tumour falls into a state of mortification. In this event, some writers have advised the extirpation of the swelling, justifying the practice on the authority of some distinguished practitioners, and the little danger attendant on the operation.

Even Sabatier only objects to this proceeding, on the ground of the danger of mistaking a prolapsus of the uterus, for one of the vagina. However, no modern surgeons in this country would hesitate about rejecting such an operation, and leaving the sloughs to separate of themselves.

The prolapsus, arising from a hernia in the vagina, can only be ascertained by attending to the symptoms which characterize this sort of rupture. See *Hernia.*

Consult particularly *Sabatier, Médecine Opératoire, T.* 2, *p.* 486, *&c. Edit.* 2. *Richter, Ansfangsgründe der Wundarzneykunst, B.* 7, *Kap.* 4.

VARICOCE'LE. (from *varix*, a distended vein, and κηλη, a tumour.) Many writers mean by the term *varicocele*, a varicose enlargement of the spermatic veins, which latter affection I have, with Celsus and Pott, treated of under the name of *Cirsocele.*

Pott remarks, that the varicocele (which is an enlargement and distention of the blood-vessels of the scrotum) is very seldom an original disease, independent of any other, and when it is, is hardly an object of surgery. The blood-vessels of the scrotum are of different size in different people; and like the vessels in other parts of the body, are liable to become varicose; but they are seldom so much enlarged as to be troublesome, unless such enlargement is the consequence of a disease, either of the testicle, or spermatic chord. When this is the case, the original disease is what engages our attention, and not this simple effect of it; and, therefore, considered abstractedly, the varicocele is a disease of no importance. (*Pott's Chirurgical Works, Vol.* 2.)

VARICOSE ULCER. See *Ulcer*, and *Varicose Veins.*

*VARICOSE VEINS. The term *varix*, is applied by surgeons to the permanently dilated state of a vein, attended with an accumulation of dark-coloured blood, the circulation of which is materially retarded in the affected vessel. When veins are varicose, they are not only dilated, they are also evidently elongated; for besides being irregular, and in several places studded with knots, they make a variety of windings, and coiling themselves, form actual tumours from the assemblage of their convolutions in one particular place. When the branches of a vein, thus dilated and elongated, are numerous, and confined to a certain part of the body, they constitute a very distinct swelling. Indeed, when the diseased vessels are situated near the integuments, the surgeon can feel, and even see their tortuous course. These things, for instance, are remarkably obvious in the vena saphena interna, in which the affection is particularly common. This vessel may be observed to form in its course several of these swellings, in the interspaces of which it runs in a very serpentine manner.

Varices are most commonly observed in the lower extremities, reaching sometimes even as far up as the abdomen. They have, however, been noticed in the upper extremities, and it is probable that the whole venous system is susceptible of the affection. As a well-informed writer observes; "The great venous trunks sometimes become varicose. When the disease is situated near the heart, it is attended with pulsation, which renders it liable to be mistaken for aneurism. Morgagni observed, that the jugular veins were occasionally very much dilated, and possessed a pulsation. (*Letter* 8, *art.* 9, 10, 11.) He also relates a case in which the vena azygos, for the length of a span, was so much dilated, that it might be compared with the vena cava. The patient died suddenly in consequence of the rupture of this varix into the right side of the chest. (*Letter* 26, *art.* 29.) A similar case is related by Portal, who also mentions an instance in which the right subclavian vein was excessively dilated, and burst into the chest. (*Cours d'Anatomie Medicale, tom.* 3, *p.* 354, 373.) Mr. Cline described in his lectures the case of a woman who had a large pulsating tumour in her neck, which burst and proved fatal by hemorrhage. A sac proceeded from the internal jugular vein; the carotid artery was lodged in a groove at the posterior part of this sac. The veins of the upper extremity very rarely become varicose. Excepting cases of aneurismal varix, the only instance of this disease with which I am acquainted, is mentioned by Petit. (*Traité des Maladies Chir. Tom.* 2, *p.* 49.) In this case, a varix was situated at the bend of the arm: the patient was so fat that no other vein could be found for the purpose of venesection, which operation Petit repeatedly performed by puncturing this varix. The superficial epigastric veins sometimes become varicose, but the most frequent seats of this disease are the venæ saphenæ, the spermatic, and hemorrhoidal veins." (See *Hodgson's Treatise on the Diseases of Arteries and Veins, p.* 538, 539.) The deep-seated veins of the extremities seldom become varicose. The disease rarely occurs before the adult period of life, and its progress is extremely slow. It is very frequently remarked in pregnant women, who have passed a certain age; but it is particularly unusual for it to happen in young women, even during a series of repeated pregnancies. Surgeons have not hitherto made out any very precise information, respecting the kinds of constitution which promote the occurrence of a varicose enlargement of the veins. Nor has it been well proved, that the disease often proceeds from swellings of the abdominal viscera, or any other species of tumour capable of mechanically obstructing the venous circulation. One or more veins of the same limb are at first most commonly affected with a slight degree of dilatation, without pain or any sensation of uneasiness. This beginning change ordinarily advances with great slowness, except in cases where it accompanies pregnancy, in which circumstance, one, or both the lower extremities, as early as the first months, are frequently seen covered with largely dilated veins, or even with tumours formed by an assemblage of varices. The veins gradually become more and more distended, lengthened, coiled up, and tortuous. The patient then begins to complain of a sense of heaviness, numbness, and sometimes of very acute wandering pain, through the whole of the affected limb. In a more advanced stage, in proportion as the varices increase, and especially when the dilated veins actually form tumours, the limb swells and becomes more or less œdematous, according to the extent of the disease, and the time which it has existed. Delpech thinks, however, that the œdema in this case, is not such as to justify the conclusion, that the increased size of the veins, and the way in which they distend the integuments, produce a mechanical interruption of the function of the absorbent system. For, says he, enormous varices are sometimes, though not often met with, which are not attended with any swelling of the cellular substance; and cases are still more frequently seen, in which there is a considerable degree of œdema, while the varices are scarcely remarkable. When the latter have prevailed a long while, and made much progress, the coats of the affected veins are not unfrequently thickened, swelled, and indurated, forming a sort of half-canal, or solid tube. As Mr. Hodgson remarks, "the blood occasionally deposits strings of coagulum in varicose veins: when this is the case, the vessel is incapable of being emptied by pressure, and is firm to the touch. The deposition does not in general fill the vessel, but by diminishing its calibre, it retards the flow of blood, and causes the dilatation to increase in the inferior portion of the vein, and in the branches which open into it." (*On the Diseases of Arteries and Veins, p.* 541.) This gentleman has seen four cases, in which the coagulum accumulated to such an extent, that the canals of the dilated vessels were obliterated, and a spontaneous cure was the consequence. The excessive distention of the coats of a superficial vein produces an inflammatory irritation, at first in the adjoining cellular membrane, and afterward in the integuments. These organs become at first connected together by the adhesive inflammation; and if the distention continues to operate, they may at length ulcerate and burst, and hemorrhage be the consequence. In such cases, the effusion of blood is sometimes considerable; but, says Delpech, we have no example of its having proved dangerous. The syncope following it, or a moderate compression, suffices for its stoppage. A more common occurrence than bleeding, is the coagulation of the blood in the cavity of a varicose vein. The vessel then becomes hard and incompressible, and it loses that elastic yielding softness, which renders it capable of being diminished by gentle pressure. If the parts be already inflamed, Delpech conceives, that the clot in the diseased vein may act as an extraneous body, and bring on ulceration, by the effects of which it is at last brought into view. In this sort of case, it is extremely uncommon for hemorrhage to occur; for in general, the vessel is already obliterated by the preceding inflammation. But the ulcer itself is very difficult to heal, and may be kept up a long while by the œdematous swelling of the limb. Varices, or rather the œdema, which is the consequence of them, has the same effect upon every other species of ulcer, and even upon the most simple solution of continuity. While the swelling of the limb cannot be dispersed; while the edges of a solution of continuity are kept asunder by the tense state of the skin; and while the divided parts are irritated by this painful tension; every thing is unfavourable to cicatrization. Thus we see the most simple wounds, which have been allowed to suppurate, and ulcers which should have healed rapidly, continue uncured a great many years, merely because the limbs on which they are situated, are affected with an œdematous swelling, the consequence of varices. Such is the condition of things in the case which has been improperly named the *varicose ulcer.* (*Delpech, Précis des Maladies Chir. Tom.* 3, *sect.* 8, *art.* 3.)

In the investigation of the causes of varices, it is usual to dwell very much upon the mechanical obstructions which may affect the circulation of the blood in the veins. Surgeons have thought themselves justified in regarding this as the only cause, because a circular, moderate compression, incontestably retards the course of the blood in these vessels, and produces a temporary dilatation of them. The opinion seems also to derive confirmation from the knotty appearance of varicose veins, a circumstance which has been accounted for by supposing that the distention is greatest in the situation of the valves. Lastly, the idea is further supported by the well-known fact of the frequent occurrence of varices during the state of pregnancy. But it has not been remembered, that the use of garters, for example, is extremely common; yet varices of the legs are infinitely less frequent; that very large varices are met with in persons, who have never employed any kind of ligatures, to which the origin of the complaint can be imputed; that when the dilatation of the veins extends to the thighs and parietes of the abdomen, no causes of this description even admit of suspicion; that varicose veins are observable round several kinds of tumours, especially scirrhi, when there is no possibility of pointing out any mechanical obstruction to the circulation of the blood; that varices sometimes make their appearance at the commencement of pregnancy, and long before the enlargement of the womb can impede the free return of the blood through the veins in the pelvis; that nothing is more unusual, than a varicose dilatation of the veins of the lower extremities in consequence of swellings of the abdominal viscera; and lastly, it has been forgotten, that the knots of the dilated veins are far too numerous to admit of being ascribed to the resistance of the valves. It cannot be denied, that pressure applied in the track of the vessels tends to promote their dilatation: but it can neither be considered as the only cause, nor as the principal one. The foregoing observations, made by Delpech, render it probable, that some unknown general cause is concerned in producing varices, the formation of which may also be facilitated by the impediments to the free return of the blood, occasioned by certain attitudes, and particular articles of clothing.

Mr. Hodgson conceives it probable, that, in some instances, the valves are ruptured in consequence of muscular exertions or external violence, in which cases the pressure of the column of blood is the first cause of the dilatation of the veins. Sometimes also the disease appears to arise from preternatural weakness in the coats of the veins, as, in those instances, in which, without any evident cause, it exists in various parts of the same person. (*Treatise on the Diseases of Arteries and Veins*, p. 537.)

Experience proves, says Delpech, that there is no certain mode of curing *varices*, strictly so called, which he thinks cannot be wondered at, since the nature and causes of the disease are completely unknown. The same source of knowledge, however, also proves, that the increase in the dilatation of varicose veins may be retarded, and that the œdematous swelling, attendant on the complaint, may be beneficially opposed by methodical and permanent compression. When the whole of a limb, affected with varices, is subjected to this last mode of treatment, the dilated veins subside, the circulation is more regularly performed, and the œdema and pain cease. There is not (says Delpech) any better method of healing the solutions of continuity in the soft parts, produced or kept up by the varicose state of the limb, and its consequences. But sometimes, as soon as the compression is discontinued, the varices make their appearance again, the pain recurs, the œdema returns, and the ulcers which were healed break out afresh.

Inflammation of the integuments covering a varix, or varicose tumour, cannot invariably be prevented by compression; nor will this treatment always succeed even in removing the intolerable pain which sometimes attends numerous clusters of varicose veins. In the first case, rest and relaxing applications will often succeed; and in the second, the topical use of sedatives frequently gives relief. It has been proposed to puncture and empty varicose veins; but if a temporary emptiness and relaxation of these vessels were to remove the pain for a time, things would fall into the old state again in the course of a few days. If the plan were adopted, it would be necessary to make a free opening in the dilated vein, and extract the coagulum. The vessel would then need no ligature above and below the opening, for the slightest compression would afterward stop the bleeding, and the vessel be obliterated by the subsequent inflammation.

We learn from Celsus, that the ancients were accustomed to remove varices by excision, or destroy them with the cautery. (*De Re Medicâ, lib.* 7, *cap.* 3.) When the vein was much convoluted, extirpation with the knife was preferred; but in other cases, the dilated vessel was exposed by an incision, and then cauterized. Petit, Boyer, and many British surgeons, have also sometimes cut out clusters of varicose veins.

Delpech remarks, that the extirpation of tumours composed of numerous varices has been practised, either for the purpose of removing the pain in the situation of the disease, or other inconveniences. This operation has been successfully performed; but it appears not to have constantly had the effect of preventing the formation of new varices, and it has sometimes proved tedious, difficult, and severely painful in its execution. In fact, an erroneous judgment must necessarily be formed of the extent of these swellings, when they are judged of only from the appearance which they present under the skin. Varices are not always confined to the superficial veins, and when they extend deeply, the operation must be ineffectual. The opinion of Delpech is, that it should never be undertaken, unless the disease be accompanied with perilous symptoms, or the patient nearly deprived of the use of his limb.

It has been thought, that one of the established principles in the treatment of aneurisms might be advantageously extended to the cure of varicose veins. By tying the principal venous trunk above the point to which the varicose affection reaches, it is said, that the course of the blood in the morbid vessels may be totally stopped; the column of this fluid made to coagulate; and the consequent obliteration of the vessels themselves accomplished.

The practice of tying veins for the cure of varices, appears to have been employed in the days of Paré and Dionis, (*Cours d'Operations de Chirurgie, p.* 610,) who have accurately described the operation of tying and dividing the vein between the two ligatures. Sir Everard Home has related many cases of varicose veins in the leg, some of them accompanied with tedious ulcers, which, after the vena saphena major had been tied, as it passes over the inside of the knee, were readily healed, and the dilatation of the veins of the leg relieved.

This practice has sometimes answered; but it has also had its failures.

Among other evils, an inflammation of the tied vein has been observed extending very far in the vessel, and succeeded by great constitutional disorder, symptoms very analagous to those of typhus fever, and death. In some of these cases, previously to their termination, abscesses form in the direction of the vessel below or above the ligature; in others, such collections of matter are not observed. (See *Travers on Wounds and Ligatures of Veins. Surgical Essays, Part* 1, *p.* 216, *and Oldknow, in Edinb. Med. and Surg. Journ. Vol.* 5. *R. Carmichael, in Trans. of the King's and Queen's College of Physicians, Vol.* 2, *p.* 345, *&c.*) Indeed, the dangers arising from an inflammation of the internal coat of the veins are now generally acknowledged, and every endeavour should be made to avoid them. A case which happened in Guy's Hospital, in 1816, fully proves them: the femoral vein happened to be pricked in an operation for aneurism, and a ligature was applied round the aperture. Inflammation of its internal coat took place, extending up into the vena cava, and the patient is supposed to have died of the indisposition resulting from it. (See *Travers's Surgical Essays, Part* 1, *p.* 222.)

Hence arises one of the most weighty objections to the practice of tying the trunks of varicose veins, with the view of curing their morbid dilatation, and its effects upon the limb.

As Mr. Brodie observes, it seems to be now established by the experience of modern surgeons, that a mechanical injury, inflicted on the trunk of one of the larger veins, is liable to be followed by inflammation of its internal membrane, and a fever of a very serious nature; and the occasional occurrence of these symptoms, after the ligature, or even the simple division of the vena saphæna, has made surgeons less confident than formerly of the propriety of attempting such operations for the relief of a varicose state of the branches of that vessel in the leg. Certain reflections, however, induced Mr. Brodie to think, that the same ill effects would not follow a similar operation performed on the branches themselves. "Where the whole of the veins of the leg are in a state of morbid dilatation, and the distress produced by the disease is not referred to any particular part, there seem to be no reasonable expectations of benefit, except from the uniform pressure of a well-applied bandage. But not unfrequently we find an ulcer which is irritable, and difficult to heal on account of its connexion with some varicose vessels; or without being accompanied by an ulcer, there is a varix in one part of the leg, painful, and perhaps liable to bleed, while the veins in other parts are nearly in a natural state, or, at any rate, are not the source of particular uneasiness. In some of these cases, I formerly applied the caustic potash, so as to make a slough of the skin and veins beneath it; but I found the relief which the patient experienced from the cure of the varix, to afford but an inadequate compensation for the pain to which he was subjected by the use of the caustic, and the inconvenience arising from the tedious healing of the ulcer, which remained after the separation of the slough.

"In other cases, I made an incision with a scalpel through the varix and skin over it. This destroyed the varix as completely as it was destroyed by the caustic, and I found it to be preferable to the use of the caustic, as the operation occasioned less pain, and as, in consequence of there being no loss of substance, the wound was cicatrized in a much shorter space of time. I employed the operation, such as I have described it, with advantage in several instances; but some months ago I made an improvement in the method of performing it, by which it is much simplified; rendered less formidable, not only in appearance, but also in reality; and followed by an equally certain, but more speedy cure.

"It is evident, (says Mr. Brodie,) that the extensive division of the skin over a varix can be attended with no advantage. On the contrary, there must be a disadvantage in it, as a certain time will necessarily be required for the cicatrization of the external wound. The improvement to which I allude, consists in this: the varicose vessels are completely divided, while the skin over them is preserved entire, with the exception of a moderate puncture, which is necessary for the introduction of the instrument with which the incision of the veins is effected. Thus the wound of the internal parts is placed under the most favourable circumstances for being healed, and the patient avoids the more tedious process which is necessary for the cicatrization of a wound in the skin above.

"For this operation, I have generally employed a narrow, sharp-pointed bistoury, slightly curved, with its cutting edge on the convex side. Having ascertained the precise situation of the vein, or cluster of veins, from which the distress of the patient appears principally to arise, I introduce the point of the bistoury through the skin on one side of the varix, and pass it on between the skin and the vein, with one of the flat surfaces turned forwards, and the other backwards, until it reaches the opposite side. I then turn the cutting edge of the bistoury backwards, and in withdrawing the instrument, the division of the varix is effected. The patient experiences pain, which is occasionally severe, but subsides in the course of a short time. There is always hemorrhage, which would be often profuse if neglected, but which is readily stopped by a moderate pressure, made by means of a compress and bandage carefully applied."

Mr. Brodie particularly enjoins the necessity of keeping the patient quietly in bed for four or five days after the operation, and removing the bandage and first dressings with the utmost care and gentleness. He also cautions surgeons not to make the incision more deep than absolutely necessary. Inflammation of the coats of the veins has not occurred in any of the cases, in which Mr. Brodie has adopted this method of treatment. This gentleman wishes it to be understood, however, that he does not recommend the practice indiscriminately, but with a due attention to the circumstances of each individual case. "The cases for which it is fitted, are not those in which the veins of the leg generally are varicose, or in which the patient has little or no inconvenience from the complaint; but those in which there is considerable pain referred to a particular varix; or in which hemorrhage is liable to take place from the giving way of the dilated vessels; or in which they occasion an irritable and obstinate varicose ulcer." (See *Méd. Chir. Trans. Vol.* 7, *p.* 195, *et seq.*)

On the subject of cutting through veins affected with varix, it is proper to observe, that even this plan has been known to bring on severe and fatal symptoms. Cases, confirming this fact, are recorded in a valuable modern work, which should be in the hands of every practical surgeon. (See *Hodgson's Treatise on the Diseases of Arteries and Veins, p.* 555, *et seq.*) It is but justice to state, however, that, in these examples, Mr. Brodie's manner of doing the operation was not adopted. On the contrary, his method, as far as I have yet heard, receives very general approbation. Some cases and observations highly in favour of it, are detailed by Mr. Carmichael. (See *Trans. of the King's and Queen's College of Physicians, Vol.* 2, *p.* 369, *&c.*)

Cases of spontaneous varix in the veins of the arm are rarely observed. When these vessels become varicose, it is almost always in consequence of a communication being formed, in the operation of venesection, between the brachial artery and one of the veins at the bend of the arm. The superficial veins in this situation then become more or less dilated, by the impulse of the stream of arterial blood which is thrown into them. There is, however, a good deal of difference between these accidental varices, actually induced by a mechanical cause, and those which originate spontaneously, or from causes not very clearly understood. The former never acquire the size which the latter often attain; they never exceed a certain magnitude, whether pressure be employed or not; they never form tumours composed of an assemblage of varicose veins; they are never filled with tough coagula of blood; their coats are never thickened, nor constitute the solid half-canal remarked in the other species of varices; the skin, which covers them, is not disposed to inflame and ulcerate; they are not subject to occasional hemorrhage; and the limb is not affected with any œdematous swelling. (*Delpech, Traité des Maladies Chir. T.* 3, *p.* 261.) These circumstances render it evident, that here all surgical interference would be unnecessary.

See *Aneurism*, where the aneurismal varix is described; *Cirsocele*, where the varix of the spermatic chord is treated of; *Hemorrhoids*, where the diseased and enlarged veins of the rectum are considered; *Varicocele*, where those of the scrotum are noticed.

VA'RIX. (from *varius*, unequal.) The term *varices* is applied to a kind of knotty, unequal, dark-coloured swelling arising from a morbid dilatation of veins. (See *Varicose Veins.*)

VEINS, DISEASES OF. To the observations and references made in the preceding article (*Varicose Veins,*) I here annex a few remarks on the principal diseases of the venous system, in order to render what has been already stated, in other parts of the work, more complete.

It is justly observed by Mr. Hodgson, that "the veins are liable to all those morbid changes which are common to soft parts in general; but the membranous lining of these vessels is peculiarly susceptible of inflammation. When a vein is wounded, the inflammation, which is the effect of the injury, sometimes extends along the lining of the vessel into the principal venous trunks, and in some instances, even to the membrane which lines the cavities of the heart. This inflammation sometimes produces an effusion of coagulating lymph, by which the opposite sides of the vein are united, so as to obliterate the tube; in this manner a great extent of the vessel is occasionally converted into a solid cord. In some instances, the secretion of pus into the cavity of the vessel is the consequence of inflammation of the membranous lining of veins: under these circumstances, the matter is either mixed with the circulating blood, or, the inflammation having produced adhesion of the sides of the vessel at certain intervals, boundaries are formed to the collection of pus, which in this manner form a chain of abscesses in the course of the vessel.

"When the inflammation of veins is not very extensive, its symptoms are the same as those of local inflammation in general; but when the inflammation extends into the principal venous trunks, and pus is secreted into the vessel, it is accompanied with a high degree of constitutional irritation, and with symptoms which bear a striking resemblance to those of typhus fever. (See *Hodgson's Treatise on the Diseases of Arteries and Veins, p.* 511, 512.)

Besides the example of inflammation of femoral and other large veins, brought on by a ligature round a small aperture, accidentally made in the femoral vein, in the operation for popliteal aneurism, as mentioned in a foregoing article, (*Varicose Veins,*) Mr. Travers reports another case, in which a fatal inflammation of the femoral and external iliac veins, with marks of diffused inflammation up to the right auricle, was apparently caused by the application of a ligature to the mouth of the femoral vein, after an amputation. (*P.* 227.) And the same catastrophe would appear to be occasionally the result of venous inflammation after amputation, even where the femoral vein is not tied. (See *Carmichael, in Trans. of King's and Queen's College of Physicians, Vol.* 2, *p.* 365.) In short, Mr. Travers's observations, as well as those of Mr. Hodgson and Mr. Carmichael, tend to prove, "that the inflammation of the interior tunic of a vein sometimes follows a puncture, sometimes a division, a ligature encircling the tube, or including only a part of it, or arises spontaneously from an inflamed surface, of which the vein forms a part." (*P.* 238.) Mr. Carmichael relates an instance, in which the appearances after death seem to evince that the patient died subsequently to an operation for femoral aneurism, of inflammation and suppuration within the femoral vein, and extending both down the saphena, and upwards through the common iliac vein. The femoral vein had been pricked in the operation, but not tied. (*Trans. of the King's and Queen's College of Physicians, Ireland, Vol.* 2. *p.* 350, *&c.*) In order to avoid the danger of wounding the femoral vein, above the edge of the sartorius, Mr. Carmichael recommends "introducing the needle on the pubal side of the artery;" (*P.* 357) a direction which should have been considered in the article *Aneurism.*

Inflammation frequently produces a thickening of the coats of the veins, as well as adhesion of their sides, and obliteration of their cavities. Indeed, in some instances, these vessels have been found to resemble arteries in the thickness of their coats, and in retaining a circular form when cut across. (*Hodgson, op. cit. p.* 513.)

Ulceration sometimes extends to the coats of veins, and, by exposing their cavities, gives rise to hemorrhage. In certain examples, it commences in the membranous lining, and destroys the other coats. In general, however, the adhesive inflammation precedes the ulcerative, and by obliterating the cavities of these vessels, prevents the occurrence of hemorrhage. When sphacelation takes place in the vicinity of veins, their cavities, like those of arteries under similar circumstances, are filled with extensive plugs of coagulum, which prevent hemorrhage upon the separation of the mortified part.

Veins are sometimes ruptured, without any previous morbid alteration in their structure, and the accident may be induced by muscular exertions, external violence, the sudden effects of the cold bath, &c.

Although a deposition of calcareous matter almost invariably takes place in the arteries of persons advanced in life, it is an extremely rare occurrence in the coats of veins.

Loose calculi have been found in the cavities of veins; and tumours sometimes grow from their lining. In a case of scirrhous pylorus, Mr. Hodgson found a tumour, larger than a hazel nut, growing from the lining of the splenic vein, and resembling in its appearance and consistence the disease which existed at the pylorus. (*P.* 524.)

The venous, like the arterial system, appears to be capable of carrying on a collateral circulation, when any part of it is impervious. Even after the obliteration of the vena cava inferior, the blood has been known to be conveyed with facility to the heart through the lumbar veins and vena azygos. In the case recorded by Dr. Baillie, (*Trans. for the Improvement of Medical and Chir. Knowledge, Vol.* 1, *p.* 127,) it is remarkable, that the vena cava inferior was obliterated at the point where the venæ cavæ hepaticæ opened into it, so that not only the blood from the lower extremities, but also that from the liver, must have passed through collateral channels to the heart.

Want of room having prevented me from introducing further observations on the diseases of veins, I must refer to the following works for additional information. *J. Hunter, in Trans. for the Improvement of Med. and Chir. Knowledge, Vol.* 1. *Abernethy's Works. J. Hodgson on the Diseases of Arteries and Veins. Longuet, Dis. sur l'Inflammation des Veins, Paris,* 1815. *B. Travers, in Surgical Essays, Part* 1, *8vo. Lond.* 1818. *F. A. B. Puchelt, Das Venensystem in Seinen Krankhaften Verhältnissen. 8vo. Leipz.* 1818. *R. Carmichael, in Trans. of the Association of Fellows, &c. of the King's and Queen's College of Physicians in Ireland, Vol.* 2, *8vo. Dublin,* 1818.

VENEREAL DISEASE. (*Lues Venerea. Morbus Gallicus. Syphilis.*) About the year 1494, or 1495, the venereal disease is said to have made its first appearance in Europe. Some writers believe, that it originally broke out at the siege of Naples; but most of them suppose that, as Columbus returned from his first expedition to the West Indies about the above period, his followers brought the disorder with them from the new to the old world. Other authors, however, among whom is Mr. B. Bell, maintain the opinion, that the venereal disease was well known upon the old continent, and that it prevailed among the Jews, Greeks, and Romans, and their descendants, long before the discovery of America.

Although many considerations lead me to reject the common history of syphilis as fabulous, I mean that account which refers its origin to America, or the French army in Italy, it does not appear to me, that any utility would be likely to result from agitating this question in modern times, because, if it be true, as the most candid and intelligent surgeons of the present day generally acknowledge, that they cannot precisely define what the venereal disease is, nor always point out the exact circumstances, in which it differs from some other anomalous complaints, even when the cases are before their eyes, how can such discrimination be attempted from a mere review of old descriptions, unaccompanied with the advantage of letting the reader judge from the living patients themselves? But, as far as the nature of the venereal disease has been unravelled, and it is allowable to judge from such comparisons, I may be permitted to remark, that, in degree of severity, the acuteness of symptoms, rapidity of propagation, and extent and quickness of fatality, no forms of disease, now ever conjectured to be venereal, bear the least resemblance to the destructive malady, with which the army before Naples, at the close of the fifteenth century, was afflicted: nor will any ignorance of the uses of mercury, as will be presently noticed, explain differences so strongly marked.

The venereal disease is supposed to arise from a specific morbid poison, which, when applied to the human body, has the power of propagating or multiplying itself, and is capable of acting both locally and constitutionally.

Mr. Hunter was of opinion, that the effects produced by the poison arise from its peculiar or specific irritation, joined with the aptness of the living principle to be irritated by such a cause, and the parts so irritated acting accordingly. Hence, he considered, that the venereal virus irritated the living parts in a manner peculiar to itself, and produced an inflammation, peculiar to that irritation, from which a matter is produced, peculiar to the inflammation.

The venereal poison is capable of affecting the human body in two different ways: locally, that is, in those parts only to which it is first applied; and constitutionally, that is, in consequence of its absorption.

In whatever manner the venereal disease was first produced, it began, says Mr. Hunter, in the human race, as no other animal seems capable of being affected by it. He conceives also, that the parts of generation were those first affected: for, if the disease had taken place on any other part, it would not have gone further than the person in whom it first arose. On the contrary, if the disease, in the first instance of its formation, be presumed to have attacked the parts of generation, where the only natural connexion takes place, between one human being and another, except that between the mother and child, it was in the most favourable situation for being propagated; and Mr. Hunter infers, also, that the first effects of the disease must have been local, in consequence of the fact, now well established, that none of the constitutional effects are communicable to other persons, that is to say, infectious.

Thus, the numberless cases of the venereal disease, afflicting generation after generation, and observable in all the known parts of the world, are supposed to be originally derived from the amours of some unfortunate individual, in whom the poison was first formed, from causes beyond the reach of human investigation. But, that any statement of this kind is more valuable than unsupported conjecture, is a proposition to which my mind is not prepared to assent, particularly when it is considered, that sores on the genitals, giving rise to such constitutional symptoms as puzzle the most discerning practitioners of the present enlightened days of medical science, are often of a very diversified character, so as hardly to admit of reference to one common origin. And, as I have already hinted, every modern speculation, about the first origin of the distemper, promises but little instruction or success, because the question relates to a disease, the diagnosis of which is still very unsettled, and the complete definition of which has hitherto baffled men of the greatest genius and experience.

According to Mr. Hunter, the venereal poison is commonly in the form of pus, or some other secretion. In most cases, it excites an inflammation, which (to use the same author's language,) is attended with a specific mode of action, different from all other actions attending inflammation, and accounting for the specific quality in the matter.

The formation of matter, though a general, is not a constant attendant on this disease; for inflammation, produced by the venereal poison, sometimes does not terminate in suppuration. But, if Mr. Hunter's sentiments are correct, it is the matter produced, whether with or without inflammation, which alone contains the poison. Hence a person, having the venereal irritation in any form, not attended with a discharge, cannot communicate the disease to another. In proof of this doctrine, he states, that though married men often contract the disease, and continue to cohabit with their wives, even for weeks, yet, in the whole of his practice, he never once found, that the complaint was communicated under such circumstances, except when connexion had been continued after the appearance of the discharge.

The late Mr. Hey, of Leeds, however, gave it as his opinion, that a man might communicate lues venerea, after all the symptoms of the disease had been removed, and he was apparently in perfect health. (See *Med. Chir. Trans. Vol.* 7, *p.* 547.) This sentiment is not only repugnant to the authority of Mr. Hunter, but to common observation and all sound reasoning. The very case, which Mr. Hey adduced, in proof of the occurrence, is decidedly inadequate to the intended purpose, in consequence of the impossibility of trusting to the accounts which patients, under circumstances involving their honour, are apt to give of themselves. In the case, recited by Mr. Hey, the gentleman might have had some venereal affection at the period of, or subsequently to, his marriage; and yet his feelings, and a sense of the disgrace of infecting a virtuous woman, might compel him to conceal the real truth from his surgeon. Again, it is to be remembered, that the lady herself might have deviated from the path of chastity, and exposed herself to infection; and, if she had done so, she would neither have informed her husband, nor Mr. Hey. I confess, that it is at all times painful to suspect the veracity of individuals, whose situations in life are respectable; but, whenever an occurrence takes place, decidedly contrary to the evidence of general experience, every possibility is to be recollected, in order to avoid the necessity of admitting doctrines not founded upon truth.

Mr. Hey, with much more reason, joins in the belief of the possibility of the venereal disease being communicated to the fœtus in utero, though in what manner the infection is transmitted is a question not yet elucidated. An universal desquamation of the cuticle; a hoarse squeaking voice; copper-coloured blotches; a scaly eruption upon the chin; and an unnatural redness of the anus; are the common symptoms which Mr. Hey sets down as proofs of syphilis in very young infants. As these complaints yield to small doses of the submuriate of mercury, or the hydrargyrus cum creta, and either the nurse or parent has had some venereal or syphiloid disease at no very distant period, the cases are often regarded as decided specimens of one of these disorders.

The venereal poison would appear to be very irregular in its effects, different persons being variously affected by it, and hence, probably, one cause of a great deal of the uncertainty, yet prevailing about its distinguishing characters. Thus, as Mr. Hunter mentions, two men sometimes have connexion with the same woman; both catch the disease; but one may have very severe, the other exceedingly mild, symptoms. He knew of an instance, in which one man gave the disease to different women, some of whom had it with great severity, while the others suffered but slightly. On the same point, I find an interesting statement, made by Dr. Hennen, in his Report of Observations on Syphilis in the Military Hospitals in Scotland:—"We have had (says he) frequent opportunities of remarking two or more sores, of different kinds, existing at the same time: an irregularly-shaped diffused sore; an elevated sore, covered with a light coloured slough, as if a bit of shamoy leather had been stuck on by some tenacious substance; a groove, or streak along the glans, as if made by a scraping instrument, filled with purulent matter; and the true and perfect chancre, according to Mr. Hunter's difinition; or the true syphilitic ulcer, according to Mr. Carmichael. This last has, in some cases, occupied the glans; in some, the prepuce; while the sores of another description have been on the same part close beside it, or on another part at a distance. Three of these cases I particularly selected for examination and public demonstration, at the Castle Hospital; in one, the Hunterian chancre was on the glans, and a sore, without any hardness on the prepuce; in another, it was on the prepuce, and a simple ulcer on the glans; in the third, a most perfect specimen of Hunterian chancre occupied the internal prepuce, close to the corona glandis; and, at about half an inch from it, nearer the frænum, but farther from the glans, was an elevated ulcer. In all these cases, the Hunterian chancre healed (without mercury) several days before the others.

"Soldiers (says Dr. Hennen) are gregarious in their amours, and we have frequently several men at the same time in hospital, infected by the same woman, with whom they have had connexion in very rapid succession; *some of them have had one kind of sore, some another, and some both.* (*Principles of Military Surgery, Ed.* 2, *p.* 525.) But, if these facts, which agree with my own observations, be rather adverse to the theory of a plurality of venereal poisons (See *Carmichael's Essays on the Venereal Disease, &c.*,) they still leave difficulties, which cannot be entirely solved by reference to peculiarities of constitution, and different states of the health, because no explanation, on this principle, would account for a man having, at the same time, upon the penis, two or three different kinds of ulcers, apparently excited by one cause. Neither will any difference of texture afford the needed explanation, though the utmost latitude be given to the doctrine, that the appearance and progress of sores are considerably modified by the nature of the parts. It is only necessary to consider the above passage from Dr. Hennen's work, to perceive that the particular texture, whether prepuce, skin, glans, or corona glandis, does not always communicate to sores one invariable character, even when they arise, as the evidence would dispose one to suppose, as nearly as possible under the same circumstances, and from the same source of infection.

But, though in such examples, no data, with which I am acquainted, lead to any safe inference, respecting the exact cause of the diversity of effect, produced in different persons, and even on different parts of the same individual, by one kind of virus, not a doubt can be entertained, that generally climate and constitution have vast influence over the venereal disease. In all warm countries, the disorder, as far as regards the natives, and those who have been long settled there, is not only much milder in its symptoms, but much more easy of cure. In the West Indies, the Brazils, &c. it has for a long period of time been very commonly cured by means of sarsaparilla, guaiacum, mezereon, &c. without a grain of mercury. It is alleged, however, that this mildness of syphilitic complaints, and their facility of cure, in warm climates, do not extend to strangers, recently arrived there, who are said even to suffer more from the virulence of the disease, than in their native climate. In Portugal, during the late war, the dreadful ravages of the venereal disease among the British soldiers, and its comparatively milder phenomena among the inhabitants of the country, were particularly noticed. "In the British army, (says Mr. Fergusson) it is probable, that more men have sustained the most melancholy of all mutilations, during the four years that it has been in Portugal, through this disease, than the registers of all the hospitals in England could produce for the last century; while venereal ulceration has not only been more intractable to the operation of mercury, than under similar circumstances at home; but the constitution, while strongly under the influence of the remedy, has become affected with the secondary symptoms in a proportion that could not have been expected. With the natives, on the contrary, the disease is very mild; curable, for the most part, by topical treatment alone, or wearing itself out when received into the constitution, after running a certain course, not always a very destructive one, without the use of any adequate mercurial remedy, &c. The bulk of the people, and of all the military at the hospitals, even though a general order has been given out, enjoining the use of mercury, cure themselves, or get cured, by other means. I have now been upwards of two years at the head of their hospital department, and I can declare, that it never occurred to me, among all the venereal patients, whom in that time I have seen pass through the hospitals, to meet a single one under the influence of mercury, excepting those cases, wherein I myself have personally superintended its administration. They go out cured by topical remedies alone; and I have lived long enough among them to ascertain, that their return to hospital under such circumstances for secondary symptoms, is far from being an universal, or even a frequent occurrence. (*Fergusson, in Med. and Chir. Trans. Vol.* 4, *p.* 1, 2.)

The inference, at which Mr. Fergusson arrives, is, that in Portugal, the disease is exhausted, and has lost much of its virulence, in the same manner as the natural small pox, unresisted by inoculation appears to have changed, in the same country, into a very mild disease, which does well under any mode of treatment.

"Yet (says Mr. Fergusson) I have no doubt, that were this mild disease, or the mildest that was ever produced from the improved inoculation of England, communicated to a tribe of Indians, or to a plantation of negroes, or any other class of people, who had never before known the small pox, it would desolate with all the fury of pestilence, destroying wherever it could find victims, and never ceasing until it had destroyed the whole." And, on the same principles, Mr. Fergusson attempts to explain the severe effects of the inoculation of the exhausted syphilitic virus of Portugal into the constitution of the British, or other stanger, and the impossibility of curing the disease by the same treatment, which answers for the natives themselves. (*Med. Chir. Trans. Vol.* 4, *p.* 7, 10.) On the other hand, Mr. Guthrie does not admit, that the disease which the troops contracted in Portugal was more violent, than the same complaint in England; or rather he admits the fact, but gives a different explanation of it from that of Mr. Fergusson; and refers the severe effect of the disease upon the soldiers in Portugal to the operation of the climate upon their northern constitutions, and to their irregularity and intemperance, vices, to which the natives are not addicted. (See *Med. Chir. Trans. Vol.* 8, *p.* 563.)

It has been a contested question, whether the venereal disease and gonorrhœa arise from the same poison? Mr. Hunter acknowledges, that the opinion, of their originating from two distinct poisons, seems to have some foundation, when the difference in the symptoms, and method of cure, is considered. But he asserts, that if this question be taken up upon other grounds, and experiments be made, the result of which can be safely depended upon, this notion will be found to be erroneous. As the arguments of Mr. Hunter, in support of the doctrine that both diseases are produced by the same virus, are noticed in the article *Gonorrhœa*, I shall not here repeat them.

On the other hand, Mr. Bell relates some experiments, from which the conclusion is made, that the poisons of the venereal disease, and gonorrhœa, are entirely different and distinct.

Matter was taken upon the point of a probe, from a chancre on the glans penis, before any application was made to it, and completely introduced into the urethra. For the first eight days, the gentleman who made this experiment, felt no kind of uneasiness: but about this period, he was attacked with pain in making water. On dilating the urethra, as much as possible, nearly the whole of a large chancre was discovered, and in a few days a bubo formed in each groin. No discharge took place from the urethra, during the whole course of the disease; but another chancre was soon perceived in the opposite side of the urethra, and red precipitate was applied to it, as well as to the other, by means of a probe previously moistened for the purpose. Mercurial ointment was at the same time rubbed on the outside of each thigh, by which a profuse salivation was excited. The buboes, which till then, had continued to increase, became stationary, and at last, disappeared entirely; the chancres became clean, and by a due continuance of mercury, a complete cure was at last obtained. If this case, and another to which I shall presently advert, could be entirely depended upon, they would tend to disprove the part of Mr. Hunter's theory, accounting for the different effects of the same poison by its application in the case of chancre to a non-secreting surface, covered with cuticle, and in that of gonorrhœa to a secreting mucous membrane. However this may be, I have never seen a chancre within the urethra.

The next experiment was made with the matter of gonorrhœa, a portion of which was introduced between the prepuce and glans, and allowed to remain there without being disturbed. In the course of the second day, a slight degree of inflammation was produced, succeeded by a discharge of matter, which in the course of two or three days, disappeared.

The same experiment was repeated; but no chancre ever ensued from it.

Two medical students were anxious to ascertain the point in question; and with this view, they made the following experiments, at a time, when neither of them had ever laboured under either gonorrhœa, or syphilis, and both in these and in the preceding experiments, the matter of infection was taken from patients who had never made use of mercury.

A small dossil of lint, soaked in the matter of gonorrhœa, was by each of them inserted between the prepuce and the glans, and allowed to remain on the same spot for the space of twenty-four hours. From this it was expected, that chancres would be produced; but in one, a very severe degree of inflammation ensued over the whole glans and præputium, giving all the appearance of what is usually termed, *gonorrhœa spuria.* A considerable quantity of fetid matter was discharged from the surface of the inflamed parts, and for several days, there was reason to fear, that an operation would be necessary for the removal of a paraphymosis. By the use of saturnine poultices, laxatives, and low diet, however, the inflammation abated, the discharge ceased, no chancre took place, and the case got entirely well. In the other gentleman, says Mr. B Bell, the external inflammation was slight, but in consequence of the matter finding access to the urethra, he was attacked on the second day with a severe gonorrhœa, with which he was troubled for more than a year.

The next experiment was made by the friend of the latter student; he inserted the matter of gonorrhœa, with a lancet, beneath the skin of the præputium, and likewise, into the substance of the glans; but although this was repeated three different times, no chancres ensued. A slight degree of inflammation was excited: but it soon disappeared, without any thing being done for it. His last experiment was attended with more serious consequences. The matter of a chancre was inserted on the point of a probe to the depth of a quarter of an inch, or more in the urethra. No symptoms of gonorrhœa ensued; but in the course of five, or six days, a painful inflammatory chancre was perceived on the spot, to which the matter was applied. To this succeeded a bubo, which ended in suppuration, notwithstanding the immediate application of mercury; and the sore, that was produced, proved both painful and tedious. Ulcers were at last perceived in the throat, nor was a cure obtained, till a very large quantity of mercury had been given, and the patient kept in close confinement for thirteen weeks. (*On Gonorrhœa Virulenta and Lues Venerea, Vol.* 1, *Edit.* 2, *p.* 438, *&c.*) Mr. Evans, it appears, has also several times inoculated with the matter of gonorrhœa, but *in every case*, it *failed* to produce any effect. (*On Ulceration of the Genital Organs, p.* 81, 8vo. *Lond.* 1819.)

Some other facts on record however, tend rather to support Mr. Hunter's inference, if any conclusion can be ventured upon without the aid of the most minute details. Thus, Vigarous mentions an instance, in which six young Frenchmen had connexion with the same woman, one after the other. The first and fourth in the order of connexion, had chancres and buboes, the second and third gonorrhœa, the fifth chancre, and the sixth bubo. (*Œuvres de Chir. Practique. Montp.* 1812, *p.* 8.) And Dr. Hennen, who refers to this case, mentions a similar one, in which the first person escaped, the second had true chancres and elevated sores, and the third gonorrhœa. The connexion took place within an hour. (*Military Surgery, Edit.* 7, *p.* 526.) These facts would indeed be much more interesting, if the disease, with which the women were affected, had been ascertained, and one could securely calculate upon the men not having exposed themselves, within a given time, to any other sources of infection. In short, without a perfect history and description of cases of this kind, from their beginning to their end, no light is thrown by them on the question about the venereal and gonorrhœal poisons. Nor does Dr. Hennen quote them with this view; but for the purpose of exemplifying the variety of effects, produced on different individuals *apparently*, by the same infection, though the same consideration, which prevents any certain inference from such observations, in regard to the identity of the venereal and gonorrhœal poisons, seems also to interfere with the other conclusion. In the experiments, detailed both by Hunter and B. Bell, there is also one point assumed by both parties, though it is far from being determined; viz. that the matter discharged from the urethra is always of one kind, in respect to its infectious principle whatever this may be, and that the secretion from every chancre contains one, and only one species of infectious matter. From the candid and very practical work of Mr Evans, it would appear, that some ulcerations on the penis, such as would usually be called chancres, though they have of late years been sometimes named elevated ulcers, *arise from an altered secretion, without any breach of surface, or discernible disease in the female organs.* The same gentleman was also frequently present at the examinations of the public women in Valenciennes, and always surprised at the small portion of disease to be found among them: "At one which I attended, (says he,) no less than 200 women of the lowest description, and of course, the most frequented by soldiers, were examined, and *not one* case of disease was found among them; nevertheless the military hospitals had, and continued to have, their *usual number* of venereal cases (ulcerations.)

"At an inspection I have since attended, where 100 women were examined, *only two* were found with ulcerations: I noticed several with increased secretions, and one with purulent discharge, but these were taken no notice of by the attending surgeons, as they did not come sufficiently under the head of virulent gonorrhœa.

"That the *two women*, above mentioned as having ulcers, infected the whole of the men diseased in garrison, during the preceding fifteen days, no one can for a moment admit even as likely; but if it be allowed, that an altered secretion be sufficient for the production of this disease, (the ulcus elevatum) we shall at once have an explanation of how it happened, that the military hospitals continued to have their usual number of venereal cases, &c." (*Evans on Ulcerations of the Genital Organs, p. 72, 73, &c.*) From the investigations of the same author, the ulcus elevatum is the most frequent of all the sores met with on the genitals, and besides being excited by diseased secretions and gonorrhœal matter, is *capable of being transferred by inoculation*, and even of originating spontaneously. (*P. 67—81, &c.*)

Lagneau admits, that gonorrhœa may not always proceed from the same poison as the venereal disease; but he believes, that in the greater number of instances, the virus is of the same quality. He is led to this opinion by the consideration of several women having been infected by the same man with *both* complaints, and of the two diseases having been communicated to several men who had cohabited with one woman, and *as is presumed with her alone*, at least, inasmuch as may relate to the possibility of any other infection weakening the conclusion attempted to be drawn from the case; a point, which has only been assumed, and by no means ascertained. However, be this and other similar narrations true, or not, in every particular, I agree with Mr. Guthrie in believing, that the evidence, adduced on the point under consideration, justifies the opinion, "that ulcers will arise on the penis from the matter of gonorrhœa; that gonorrhœa will, in its turn, be caused by the matter of these same ulcers, and that both occur in consequence of promiscuous, or uncleanly intercourse. *That many of the ulcers produced in this manner, will occasionally assume every character of chancre, and cannot be distinguished from it*, I am perfectly satisfied of from repeated observation; but I am equally certain, that a gonorrhœa in men, with the worst appearances and symptoms, can, and often does, arise from irritating causes common to parts free from any specific disease, or poison, is not distinguishable from one that has arisen from promiscuous intercourse, and that both complaints are curable in the same way, and without mercury." On the question, whether gonorrhœa, or the ulcers resulting from the matter of gonorrhœa, can produce constitutional symptoms, Mr. Guthrie believes, that they generally do not, although he does not affirm, that they cannot under particular circumstances of constitution; and he is further of opinion, that if such symptoms ever really arise, they become serious only in consequence of the exhibition of mercury. (See *Med. Chir. Trans. Vol. 8, p. 554*

From what has been already observed, it must be evident, that one of the greatest obstacles to our arrival at a satisfactory knowledge of the nature of lues venerea, is the fact, that under this denomination, many various diseases are comprised and confounded, and the particular distinctions of each of which are not yet sufficiently made out, to enable surgeons to form a well-founded, and practical classification of them, satisfactory to every impartial observer, and agreeing with general experience. But though such progress has not yet been made, the attention of modern practitioners, and especially that of Mr. Carmichael, has been directed to the subject. In fact, notwithstanding some mysterious circumstances in particular syphilitic cases may not admit of complete and satisfactory explanation by the doctrine of a plurality of poisons, no intelligent surgeons, I believe, now suppose that the diseases, frequently communicated by sexual intercourse, always proceed from one peculiar poison. As Mr. Rose has observed, long before syphilis is supposed to have commenced its career in the world, some of these diseases were frequently met with, and Mr. Pearson thinks, that, in addition to those formerly known, new forms of disease have occasionally arisen, "which are succeeded by a regular series of symptoms nearly resembling the progress of lues venerea." (*Obs. on the Effects of various articles of the Materia Medica in the Cure of Lues Venerea, 2d Ed. Introd. p. 53; and Rose in Med. Chir. Trans. Vol. 8, p. 418.*) Mr. Hunter also, in the seventh chapter of his Treatise on the Venereal Disease, speaks of many examples of new-formed diseases, arising from peculiar poisons, quite different he supposes, from every other virus previously known, or judged of by its effects. But, though Mr. Rose appears to join in the belief of a plurality of poisons, he is very far from considering it settled, how far the variety in the symptoms of venereal cases is to be attributed to different poisons, or how far the symptoms of the same poison may be modified, and altered by constitution, climate, and habits of life. He remarks, that we seldom have an opportunity of tracing different cases to the same source of infection, and of comparing their progress with each other. (*Vol. cit. p. 419.*) And, I may add, that as far as observations of this nature have been made, and can be trusted, they rather tend to prove, as already noticed in the foregoing columns, that different individuals, when infected nearly at the same time, and by the same woman, are very far from having any uniformity in their complaints; some having one kind of sore; some another; and others claps, &c. And the tenor of the remarks, made likewise by Mr. Evans, as far as he has yet entered into the subject, lead equally to the conclusion, that one primary complaint, when it produces another, does not always occasion one resembling itself. Thus, the ulcus elevatum on the penis, though capable of being communicated by inoculation, appeared sometimes to be the effect of one kind of infection, sometimes of another, and sometimes even to have a spontaneous origin. Who shall unravel all these intricacies, I know not, whether he bring to his assistance plurality of poisons, or states of the parts and constitution, climate, neglect, wrong treatment, or any other circumstance, which can possibly be conceived to have influence over the appearances, progress, and consequences of the disease? Nay, it would appear from some of the curious and perplexing histories mentioned in the preceding pages, that one kind of primary complaint in an individual may impart to other persons primary complaints of a different nature. so that even the hope of elucidating parts of this abstruse subject, by adverting to a plurality of infections, and a vigilant observation of their characteristic effects, meets with discouragement almost at its very birth; and though the doctrine of several kinds of poisons being concerned in the production of syphilis and syphiloid diseases still maintains its ground, an absolute proof of its correctness can hardly be said to have been yet afforded; nor, indeed, could it be obtained, unless the inoculation of healthy individuals with the matter of the different forms of disease were justifiable for the elucidation of the question. And, as this is not the case, I think, with Mr. Carmichael, that it might be a benefit to society, if criminals were sometimes permitted to commute a heavier punishment by submitting to such experiments, without which the inquiry into the reality, number, nature, and effects of the morbid poisons under consideration, can perhaps never be brought to a satisfactory termination. "I am perfectly aware (says Mr. Carmichael,) how much the state of the human constitution will modify local diseases, and am willing to attribute to a certain extent, the great variety of appearances, we witness daily in venereal complaints, to this cause alone. But, we observe that many of those primary ulcers evince, from their very commencement, such peculiar and distinct characters, that it would be quite an absurdity to believe, that the virus is always the same, and the variety of characters dependant alone upon constitution. Thus nothing can be more opposite, from the commencement, than the common chancre, with its hardened base, like a piece of cartilage under the skin, and the sloughing ulcer. The first is slow and chronic; the latter begins with a mortified spot, extends by alternate sloughing and phagedenic ulceration, and makes more progress in three days, than the former in as many weeks.

"The phagedenic ulcer is equally distinct from chancre, as it does not evince, at any period, a hardened base, but gradually creeps from one part to another of the penis, leaving those parts to heal, which, in the first instance, it attacked; so that, when the disease has existed for some months, the glans is seen to exhibit its entire surface furrowed over with ulcerations and cicatrices.

"There is a raised ulcer, also, with elevated edges, approaching the nature of the phagedenic ulcer, yet, whose characters are sufficiently distinct to be considered as a separate species. But, the most common venereal primary ulceration presents such various appearances in different individuals, that, until a more exact knowledge is obtained, it is better described by its negative, than its positive qualities, and it may be designated an ulcer without induration, raised edges, or phagedenic surface.

"If (continues Mr. Carmichael) the plurality of venereal poisons is supported by the variety of primary ulcers, it is equally so by the multiplicity of constitutional eruptions. A primary ulcer, which was not phagedenic, or sloughing, at first, may afterward, like any other ulcer, become so by irritation, neglect, or inflammation. But I do not conceive, that we have grounds for supposing, that the state of the constitution can so modify morbid poisons, as to cause the same virus to produce in one person the chronic scaly lepra, and psoriasis, and to assume in another a decided pustular form, each pustule spreading rapidly into a deep ulcer." (*On the Symptoms and Specific Distinctions of Venereal Diseases*, p. 6, *&c.* 8*vo. Lond.* 1818.)

The same gentleman, in his Essays on this subject, published some years previously to the above date, gives his reasons for believing that certain primary appearances are followed by a corresponding train of constitutional symptoms. 1st. That the syphilitic chancre gives rise to scaly eruptions, lepra, and psoriasis, an excavated ulcer of the tonsils, and pains and nodes of the bones. 2dly. That the ulcer, without induration, raised edges, or phagedenic surface, gonorrhœa virulenta, and excoriation of the glans and prepuce, are followed by a papular eruption, which ends in desquamation, pains in the joints resembling those of rheumatism, soreness of the fauces, and frequently swelling of the lymphatic glands of the neck; but without any nodes of the bones. 3dly. That the ulcer, with elevated edges, in the few instances in which it was traced by Mr. Carmichael to its constitutional symptoms, was followed by a pustular eruption, which terminated in mild ulcers, pains in the joints, and ulcers in the throat, but no appearance of nodes. 4thly. That the phagedenic and sloughing ulcers are generally attended with constitutional symptoms of peculiar obstinacy and malignancy: viz. pustular spots and tubercles, which form ulcers, generally spreading with a phagedenic edge, and healing from the centre. Extensive ulceration of the fauces, particularly of the back of the pharynx, obstinate pains of the knees, and other joints, while nodes are frequently present, and the bones of the nose are occasionally affected. (See *Carmichael's Essays and his Obs. on the Symptoms, &c. of Ven. Diseases, p.* 9.)

The observations of other modern writers seem generally to coincide with those of Mr. Carmichael, respecting the great variety of character in primary venereal sores, and partly also with regard to the hypothesis of there being various kinds of poisons, or infectious matter. But, on some other great questions, immediately connected with these points, little similarity of opinion prevails between him and other gentlemen, who have laudably and impartially entered into the disquisition. And, in the first place, without adverting again to certain statements, already premised, which render it probable, that differences of the virus, or, at all events, differences in the forms of the primary complaints in the contaminating individuals, would not always explain the reason of the diversified appearances and nature of the primary forms of disease in the contaminated, I shall lay before the reader other evidence, having an immediate relation to Mr. Carmichael's sentiment, that each kind of primary veneral sore is followed by a peculiar and corresponding train of constitutional symptoms. In the cases recited by Mr. Rose, "most of the papular eruptions followed ulcers, which were not very deep, and which healed without much difficulty. Several of them had a thickened, but not a particular indurated margin. This corresponds with the observations of Mr. Carmichael,—*I could not, however, discover any decidedly uniform character in such sores;* and the 16th case I should have considered as a well-marked instance of chancre." (*Med. Chir. Trans. Vol.* 8, *p.* 399.) In another place, it is stated, that the appearances of sores can seldom be relied on in parts of such vascular structure, and in the midst of sebaceous glands. (*P.* 419.) With respect to the phagedenic ulcer, Mr. Rose expresses his belief, that it is rarely followed by secondary symptoms, though he inclines to the opinion, that it arises from the application of some morbific matter, acknowledging, however, the great difficulty of deciding, "whether the great degree of erethismus, excited by the local affection, should be attributed to any peculiarity in that matter, or is owing to the peculiar state of the constitution." (*Med. Chir. Trans. Vol.* 8, *p.* 372.) And he then refers to the case, reported by Mr. Fergusson, where "the infection was communicated by an opera dancer at Lisbon, apparently in perfect health, who continued on the stage for several months afterward, occasionally infecting others, without any thing extraordinary, as far as he could learn, in the nature of the symptoms." (*Op. cit. Vol.* 4, *p.* 12.) And, on the same subject, Mr. Guthrie does not think, "that Mr. Carmichael's opinion, as to the secondary symptoms, peculiar to the phagedenic and sloughing ulcer, receives any support from what occurred to the troops in Portugal; because it did not appear, that either of them, following sexual intercourse, were dependent on the cause which produced the ulcer. Where many men have had intercourse with the same woman (and with no others?) they have not all had the same complaint, although one of the ulcers, so originating, has become phagedenic, or sloughed; neither has the same woman herself suffered from this distemper; indeed, the nature of an ulcer of either kind must, after a short time, effectually prevent any intercourse, and we often find, that their peculiar characters only appear after the ulcer has existed for several days. I firmly believe also, that in the greater number of cases of sloughing ulcer, *where mercury is not given, no secondary symptoms would appear:* and, in those cases in which they did appear, I apprehend, they would be equally dependent on the state of the constitution, as to the mode of cure, and their destructive characters. In other words, my observations lead me to conclude, that *these ulcers do not depend upon a specific poison,* but *on the state of the constitution,* under particular excitement, and that, *when secondary symptoms occur, they are not dependent on the state of the ulcer;* although I am ready to admit, that in a constitution where an ulcer will readily become phagedenic, the secondary symptoms, when they occur, may be different to a certain extent from those that follow more simple ulcers, in a healthier habit of body." (*Guthrie in Med. Chir. Trans. Vol.* 8, *p.* 564.) My observations lead me to believe, with Mr. Guthrie, that primary *sloughing* ulcers do not depend upon any peculiar poison, and I am also disposed to join him in the opinion, that when hurtful local treatment is out of the question, they are chiefly owing to the state of the constitution. According to my experience, all kinds of ulcers on the genitals may, from particularity of constitution, impairment of health, and sometimes from the pernicious effects of the immoderate and indiscriminate employment of mercury, assume in their progress a sloughing disposition, and even have it from their very commencement. Mr. Rose mentions a case in which a *healthy* young man was affected with a sloughing sore on the penis, in consequence of a suspicious connexion. It was not attended with any constitutional disturbance, and yielded readily to mercury. The same patient, twice afterward, at a very considerable interval, had a fresh infection, and the sores each time had precisely the same character as the first. This, says Mr. Rose, is no uncommon occurrence, and it is not probable that the sloughing and appearance of the sores arose from the peculiarity of the poison. (*Med. Chir. Trans. Vol.* 8, *p.* 420.) And another intelligent and experienced surgeon, who has particularly attended to this investigation, declares his conviction, that "many varieties of sore, independently of the sloughy chancre, mentioned by Mr. Carmichael, lead to constitutional symptoms, differing in no respect from those he has described, and admitting of the same mode of cure." Nor does he believe, with Mr. Carmichael, that only one particular species of sore is capable of producing the true secondary symptoms of lues. (*J. Bacot, on Syphilis, p.* 51.)

From these observations, I think we may safely infer, that with respect to the *sloughing ulcer,* it neither arises from the application of any one specific poison to the part, nor is it connected with any regular train of secondary symptoms.

Dr. Hennen assures us, that he has frequently had occasion to observe, that eruptions of the same nature and character have succeeded to the foul, indurated, excavated ulcer, and to the simple excoriation. "In fifteen cases of eruptions, unaccompanied by any other symptoms, which succeeded the Hunterian sore, six were tubercular, five exanthematous, two pustular, one tubercular and scaly, and one tubercular and vesicular.

"In four cases following the same sore, but in which the eruptions were complicated with sore throat, two were tubercular, one was tubercular and scaly, and one was tubercular and axanthematous.

"In twelve cases following the *non* Hunterian sore, and in which eruptions were the only symptoms, six were pustular, three were exanthematous, and one was tubercular and scaly.

"In seven cases where the eruption was accompanied with sore throat, three were exanthematous, two were tubercular, one was papular, scaly, and tubercular," and one was pustular and tubercular. Dr. Hennen also recites an instance in which a Hunterian chancre was, at the distance of ten weeks, succeeded by a *papular eruption*, which, in the course of a month, was removed by low diet, purgatives, and the decoction of sarsaparilla. In two months afterward, an eruption of a similar nature appeared without any fresh infection. This was treated with mercury, which was administered five weeks, so as to excite a moderate salivation. Under this treatment the eruption faded, having, during its progress, assumed the appearance of *vesicles* and *pustules*, and at length falling off in amber-coloured *scales*, with livid bases. Notwithstanding this mercurial course, the patient was a third time admitted, ten weeks afterward, (without any intervening primary affection) with a *pustular* eruption, which was finally cured without mercury, and the pustules falling off in squamulæ. In another month, without any fresh infection, he was a fourth time taken into hospital, with a very thickly dispersed *pustular* eruption, somewhat different from the former, the pustules being more numerous, smaller, and acuminated. They yielded to non-mercurial treatment. During all these attacks, there was apththous sore throat, and occasional flying pains in the joints. The inference drawn from this case is, that even a full and judiciously conducted mercurial course does not prevent the reappearance of venereal eruptions, and that they assume at different times different characters, notwithstanding the interruption they receive in their natural progress by the use of that remedy. (*On Military Surgery, Ed.* 2, *p.* 528—530.) After these accounts, I can have no hesitation in coming to another conclusion, which is, that, with the exception of the partial confirmation of Mr. Carmichael's doctrine by Mr. Rose, as far as relates to the frequency of papular eruptions after superficial primary ulcers, the regular connexion of particular forms of secondary symptoms with any given descriptions of primary sores, is so far from being supported by the testimony of other observers, that one kind of primary ulcer may lead, in the same patient, to eruptions of several different sorts, either existing together on various parts of the body, or breaking out in succession; and no regular connexion can be traced between any one species of primary sore, and any determinate class of secondary symptoms. These truths, I believe, must be admitted, disadvantageous as they are to the prospect of bringing the diagnosis of syphilis to a final settlement, so as to enable the writer to describe the disease with accuracy, and the practitioner to recognize and treat it with certainty. The first essential step to the elucidation of this subject, however, is undoubtedly the subversion of every doctrine relative to it, which is repugnant to general experience. The same facts, which may render it necessary for Mr. Carmichael to retract some of his inferences, and which have now been established beyond all doubt or possibility of successful contradiction, by the very impartial, disinterested, and extensive investigations, made in the army hospitals, would have obliged even Hunter himself, had he been alive, to confess the mistaken views which he sometimes took of the nature of the venereal disease.

Among other doctrines, Mr. Hunter inculcates, that "the venereal matter, when taken into the constitution, produces an irritation which is capable of being continued, independent of a continuance of absorption, *and the constitution has no power of relief*; therefore, *a lues venerea continues to increase.*" The same criterion was proposed by Mr. Abernethy, who states, that the "constitutional symptoms of the venereal disease are generally progressive, and never disappear unless medicine be employed." (*Surgical Observations, p.* 137.) And, notwithstanding some dissent may be traced in both old and modern writers from the belief that mercury was absolutely essential to the cure of the venereal disease, and an opposite conclusion might easily have been drawn from the whole history of this subject, including the practice of former and present times, the contrary hypothesis was that always taught in all the great medical schools of this country, even down to so late a period as eight or ten years ago. But the error no longer prevails, and no facts are more completely established than that mercury, however useful it may frequently be in the treatment of the venereal disease, is not absolutely necessary for the cure either of the primary or secondary symptoms, and that the disease, so far from always growing worse, unless mercury be administered, alternately gets well, without the aid of this, or any other medicine. If any man yet doubt the general truth of this statement, let him impartially consider the many facts and arguments brought forward in proof of it in the writings of Mr. Fergusson, Mr. Rose, Dr. Hennen, Dr. Thomson, Mr. Guthrie, Mr. Bacot, and other modern practitioners. In short, if there be such a sceptic now living in this country, let him peruse the returns made by the surgeons of the whole British army, documents which will be noticed in the sequel of this article; let him consider the evidence of the surgeons of other countries, especially that of Cullerier, who annually demonstrates to his class of pupils the cure of venereal ulcers without mercury; and the testimony and practice of the German surgeons, who were attached during the war to regiments of their countrymen in the British service. The fact is therefore indisputable, that the venereal disease, in all its ordinary and diversified forms, is capable of a spontaneous cure, and consequently, that the question, whether the disease is syphilitic or not, can never be determined by the circumstance of the complaint yielding, and being permanently cured, without the aid of mercury. Yet, as Mr. Rose has observed, the supposition, that syphilis did not admit of a natural cure, and that mercury was the only remedy that had the power of destroying its virus, was of late so much relied upon, that where a disease had been cured without the use of that medicine, and did not afterward return, such fact alone, whatever might have been the symptoms, was regarded as sufficient proof that it was not a case of syphilis. And, as the same writer very judiciously remarks, the refutation of these notions is of considerable importance, "not so much in reference to the treatment of syphilis under common circumstances, for the strikingly good effects of mercury will probably not render it adviseable in general to give up the use of that remedy, but from *the change it will produce in our views of the diagnosis of the disease.* The distinction which has engaged such a share of attention of late years, and which is evidently so important between syphilis and syphiloid diseases, has been made to depend so much on the former admitting of no cure, except by mercury, that if this principle should be found to be erroneous, the difficulties which have attended it will in a great measure be explained." (*Med Chir. Trans. Vol.* 8, *p.* 350, 351.) That it is erroneous will appear more clearly when the treatment of syphilis falls under consideration.

Excluding from present attention works of ancient date, it is curious to find how very near several writers, within the last twenty or thirty years, arrived at the same point to which recent investigations have led. Thus, Mr. B. Bell observes, a chancre might frequently be cured with external applications alone, and as we know from experience that the virus is not always absorbed, *the cure would in a few instances prove permanent;* but as we can never with certainty know whether this would happen or not, while, in a great proportion of cases, there would be reason to think that absorption would take place, we ought not in any case to trust to it." (*On Gonorrhœa Virulenta, &c. Vol.* 2, *Ed.* 2, *p.* 325, 8*vo. Edinb.* 1797.) And, in some reflections upon a case of doubtful nature, Dr. Clutterbuck long ago remarked: "Supposing even that the diseased appearances had after a time got well of themselves, *I should deem even this no absolute proof of their not being of a venereal nature.* I have seen cases which induce me to believe, that *the venereal disease*, in some of its stages, and in certain circumstances, *may get well without mercury or any other remedy.* But this is contrary to the doctrine of Mr. Hunter, who supposed that venereal actions go on increasing, without any tendency to wear themselves out That lues venerea is much modified by climate, and other circumstances, is generally allowed; that it has been cured by other means than mercury, we have also very sufficient evidence in the older writers on the subject: not to mention the late successful trials with acids and other substances. *Many of the appearances on the skin go off spontaneously.* "When purple spots appear on the skin," (Mr. Hunter observes, *p.* 319,) "giving it a mottled appearance in this disease, many of the spots disappear, whilst others continue and increase." (*H. Clutterbuck, Remarks on some of the Opinions of the late Mr. John Hunter, p.* 27, 8*vo. Lond.* 1799.) If Dr. Clutterbuck had advanced one step further, and declared that the venereal disease might be cured without mercury, or any other remedy, in all, or nearly all its forms, and not merely in some of them, he would actually have anticipated the most important fact, recently established chiefly by the meritorious labours of the army surgeons, whose opportunities of making the investigation were better on several accounts than those of private practitioners, who generally soon lose sight of their patients, and never have them sufficiently under their control and observation to render a full perseverance in any method a matter of certainty. At all events, Dr. Clutterbuck may justly claim the merit of having distinctly marked the fact, that *the circumstance of a disease giving way, and being cured without mercury, is no proof that the case is not venereal.*

One of the most ingenious theories ever devised for explaining all the perplexities and irregularities of syphilis, is unquestionably that of the late Mr. Hunter; for, it accommodated itself almost to every thing, and every believer in it fancied he could account satisfactorily for many puzzling occurrences which admitted of no good explanation on other principles. Mr. Hunter inculcated, that the parts contaminated by the absorption of the venereal poison, do not immediately begin to be palpably diseased, but only acquire *a disposition to take on the venereal action.* He further believed, that when this *disposition* was once formed in a part, it necessarily changed into *action*, or manifest disease, at some future period.

That mercury can cure the disease, when positively formed, but not the *disposition* to it. That although mercury cannot destroy the *disposition* already contracted, yet that it can prevent it from being formed at all. That the *disposition* never becomes the real disease, or, in Mr. Hunter's language, goes into action during the use of mercury. That the action having once taken place, always increases, never wearing itself out. That parts, once cured, never become again contaminated from the same stock of infection. And, that the matter of secondary ulcers, or those which break out in consequence of absorption, is not infectious. What Mr. Hunter meant by the term *disposition*, I think is better explained than the grounds for the adoption of the theories connected with it, viz. the presumption of its being formed in all the parts capable of contamination; the certainty of its future change into actual disease; the impossibility of curing it by mercury previously to such a change; but the possibility of preventing its formation at all by the timely use of that remedy.

Dr. Clutterbuck has well observed, that the only foundation for all these hypotheses, connected with the phrase *disposition*, is the fact, that *secondary symptoms sometimes arise, notwithstanding a full use of mercury*. If, says this gentleman, we were to suppose, with Mr. Hunter, that all the parts which are susceptible become at once contaminated, and mercury has no influence over them in this state, the constitution should become affected in almost all cases, for absorption probably always precedes the application of remedies. Either, therefore, mercury does prevent the future action, or a more frequent absence of susceptibility to the disease must be supposed, than there are grounds for imagining. (*Remarks on the Opinions of Mr. Hunter*, p. 9—12.) But, surgeons of the present day, enlightened by many new facts unequivocally determined since Mr. Hunter's time, know very well that a *disposition* to the disease is in many instances not produced at all, even though the matter of a chancre be supposed to be absorbed, since in a large proportion of cases of chancres, which had all the characteristic appearances of such ulcers, according to Mr. Hunter's own description, no secondary symptoms followed, though the patients were treated and cured without any mercury. Yet, if Mr. Hunter's theory were true, the disposition must have been produced, the action or disease itself in the form of secondary symptoms must have ensued, sooner or later, and no cure could have been ultimately effected without mercury. Fortunately for mankind, unsound as some of the theories seem, which are attached by Mr. Hunter to the supposed *disposition to the venereal disease*, or its latent form, there was one piece of advice given by him, which may be said to have had a beneficial effect in practice, though founded upon these very doctrines; and it was this, "that we should push our medicine no farther than the cure of the visible effects of the poison, and allow whatever parts may be contaminated to come into action afterward." (*On the Venereal Disease*, p. 334.) This maxim, I know, has been regarded by some admirers of long salivations as the cause of many relapses and imperfect cures; but when I advert to the dreadful mischief, which formerly attended protracted courses of mercury for latent and imaginary complaints, my mind regrets that Mr. Hunter himself should not have adhered strictly in practice to his own principle, from which he undoubtedly deviated with his patients, and even in certain other parts of his writings. However, the effect has been to discourage long courses of mercury; and, perhaps, in this way, the world has been benefited by the counsel, though not rigorously adopted by him who gave it. Confessing my own inability to reconcile the various theories, about the nature and effects of the venereal poison, to many facts, which are disclosed in practice, I shall now proceed to offer a few remarks on each of the primary and secondary symptoms.

Chancres. The penis, as Mr. Hunter has observed, which in men is the common seat of a chancre, is, like every other part of the body, liable to diseases of the ulcerative kind, and, on some accounts, is rather more so than other parts. When attention is not paid to cleanliness, excoriations or superficial ulcers often originate. The genitals, also, like almost every other part that has been injured, when once they have suffered from the venereal disease, are very liable to ulcerate again. Since therefore the penis is not exempted from common diseases, every judgment of the nature of ulcers upon it, as Mr. Hunter truly remarks, should be formed with great attention, particularly as all diseases upon this part are suspected to be venereal. But for a particular description of the many ordinary complaints, which are apt to occur on the genitals, either preceded or unpreceded by sexual intercourse, I refer to Mr. Evans's treatise. (See *Pathological and Practical Remarks on Ulcerations of the Genital Organs*, 8vo. *Lond.* 1819.) From facts already mentioned in this article, however, it would appear that primary syphilitic ulcers or chancres, by which I imply sores capable of giving rise to the secondary symptoms of the venereal disease, have no determinate external character, are extremely diversified in their appearance, and absolutely cannot be distinguished by their mere look from sores which are of a common, or at least a very different nature. This is another important fact, for which every man in the profession who seeks only truth, and the expulsion of errors from the doctrines of surgery, must feel obliged to the army surgeons. Nor is their merit lessened by the consideration, that the detection of mistake on this point, like the discovery of the error, concerning the invariable progress of the venereal disease from bad to worse, unless medicine be given, has taken place in opposition to the tenets of Mr. Hunter. "*Venereal ulcers* (says he,) *commonly have one character,* which, however, is not entirely peculiar to them; for many sores that have no disposition to heal (*which is the case with a chancre,*) have so far the same character. *A chancre has commonly a thickened base;* and, although in some, the common inflammation spreads much further, yet the specific is confined to this base." (*P.* 215.) And elsewhere, he observes, a chancre first begins with an itching in the part. When the inflammation is on the glans penis, a small pimple, full of matter, generally arises, without much hardness or seeming inflammation, and with very little tumefaction; for the glans penis is not so apt to swell in consequence of inflammation as many other parts are, especially the prepuce. Mr. Hunter also explains, that chancres, situated on the glans, are not attended with so much pain and inconvenience as sores of this nature on the prepuce. When chancres occur on the frænum, or particularly on the prepuce, a much more considerable degree of inflammation soon follows, attended with effects more extensive and visible. These latter parts, being composed of very loose cellular membrane, afford a ready passage for the extravasated fluids. The itching is gradually converted into pain: in some cases the surface of the prepuce is excoriated, and afterward ulcerates; while, in other examples, a small pimple or abscess appears on the glans, and then turns into an ulcer. *The parts become affected with a thickening, which at first, while of the true venereal kind, is very circumscribed;* not diffusing itself, as Mr. Hunter observes, gradually and imperceptibly into the surrounding parts; but *terminating rather abruptly. Its base is hard, and the edges a little prominent.* When it begins on the frænum, or near it, that part is very commonly wholly destroyed, or a hole is often made through it by ulceration. Mr. Hunter thought it better, in general, under the latter circumstance, to divide the part at once.

When the venereal matter is applied to the body of the penis, or front of the scrotum, where the cuticle is thicker than that of the glans penis and prepuce, the chancre generally makes its appearance in the form of a pimple, which commonly forms a scab, in consequence of evaporation. The first scab is generally rubbed off; after which a second, still larger one, is produced.

When the disease is more advanced, it is often attended with inflammation peculiar to the habit, becoming in many instances more diffused, and often producing phymosis and paraphymosis. However, says Mr. Hunter, *there is yet a hardness around the sores, which is peculiar to such as are caused by the venereal virus,* particularly those on the prepuce.

Mr. Carmichael, also, in his arrangement of primary ulcers on the penis, considers the true chancre as being particularly distinguished by its hardened base, which he compares to a piece of cartilage under the skin. It is to be observed, however, that Mr. Carmichael, by the true chancre, or primary syphilitic ulcer, does not signify that it is the only sore from which secondary symptoms may arise; but his observations lead him to regard it as the cause of such constitutional effects as belong to what he deems the true form of syphilis, or that in which the use of mercury is the most decidedly indicated. It would give me sincere pleasure to find any agreement on this part of the subject among other observers. The reader, indeed, must already know, that the hardened base, which both Hunter and Carmichael have regarded as a distinguishing character of a true chancre, is not found to be so by other gentlemen, who have most impartially investigated this point. Thus, Dr. Hennen observes, "we are not in possession of the knowledge of any invariable characteristic symptoms, by which to discriminate the real nature of the primary sore, and we are equally at a loss in many of the secondary symptoms. I am well aware that some practitioners have assumed to themselves the possession of a "tactus eruditus," by which they can at once distinguish a chancre, or a venereal ulcer, or eruption, in which mercury is indispensable, from one of a different nature; but I have seen too many instances of self-deception to give them all the credit that they lay claim to. It would be by no means difficult to show that the high round edge, the scooped or excavated sore, the preceding pimple, the loss of substance, *the hardened base and edge, whether circumscribed or diffused,* and the tenaciously adhesive discharge of a very fetid odour, are all observable in certain states and varieties of sores, unconnected with a venereal origin. The hardened edge and base, particularly, can be produced artificially by the application of escharotics to the glans or penis of a sound person; and if any ulceration, or warty excrescence, previously exists on these parts, this effect is still more easily produced." (*On Military Surgery, Ed.* 2, *p.* 517.) Now, if it be asked, whether the chancre with a hardened base, and prominent edge, is distinguished by its not admitting of cure without mercury? and by any regularity or peculiarity in the nature of secondary symptoms, when they originate from such an ulcer? modern experience denies the validity of both these criteria. If Mr. Rose's excellent paper be consulted, the reader will see that this gentleman has certainly cured, without the aid of mercury, ulcers, which had a decidedly marked induration of the margins and bases, by which the syphilitic chancre, according to Mr. Carmichael, is easily distinguished. (*Med. Chir, Trans. Vol.* 8, *p.* 421, *&c.*; also *Guthrie, Vol. cit. p.* 576.) And, as for the other points, sufficient evidence has already been detailed in the foregoing columns to satisfy any impartial mind, that, as far as the eye can teach us, no kind of primary sore has yet been satisfactorily proved to be the cause of only one set of peculiar constitutional symptoms; but, on the contrary, that a great variety of appearances in the skin, throat, &c. may follow sores, which, as far as external characters are concerned, seem exactly alike. The only partial exception to this remark is the great frequency of papular eruptions after superficial sores; a point on which both Mr. Carmichael and Mr. Rose agree, though the latter gentleman does not represent even this connexion as constant. Mr. Hunter computed, that claps occur more frequently than chancres, in the proportion of four or five to one. I am not prepared to offer any opinion on this calculation, in reference either to chancres, as defined by that interesting writer, or under the more comprehensive view of them, to which the results of modern investigations would lead. One intelligent writer, however, has observed, that present experience does not justify Mr. Hunter's conclusion respecting the infrequency of chancre compared with gonorrhœa. (*J. Bacot, Obs. on Syphilis, p.* 54.) Yet, in Dublin, if Mr. Carmichael's statement be correct, the frequency of gonorrhœa, as compared with that of what is sometimes termed the true venereal chancre, must be so great as to defy all computation; for he informs us, that since the descriptions of the success of the non-mercurial practice fell into his hands, he has been anxious to ascertain, by personal observation, whether true syphilitic chancres did really admit of being cured without mercury; but, says he, "this disease, as described by Hunter, has diminished in so extraordinary a degree in this country, that, strange to say, I have from that period met with only one case of true chancre." (*Observations on the Symptoms, &c. of Venereal Diseases, p.* 14.) As this chancre remained stationary a month, it was thought proper to employ mercurial frictions, and it then soon healed, leaving a callosity which continued two months longer. However, after the above passage was written, Mr. Carmichael met with two cases of "well marked chancre," each of which was attended with psoriasis syphilitica, scaly from its commencement. No mercury was given. For five weeks, the disease gained ground; but, in the end, both cases were cured, merely sarsaparilla having been administered. The following observations, contained in the appendix to Mr. Carmichael's work, do him infinite credit. "Although, (says he,) these two cases cannot fail to make a due impression, yet, if they stood alone, their evidence could not be deemed sufficient to establish a belief, that true syphilis, like the papular disease, is capable of yielding to the powers of the constitution, or to remedies in which mercury does not form an ingredient. But this deficiency seems to be, in a great measure, supplied by the testimony of Mr. Rose, Mr. Hennen, and other equally intelligent surgeons, who had the advantage of serving with our army on the continent; and, if in the preceding pages I appear to be sceptical with respect to the accuracy of their observations, and doubted that it was true chancre, and true syphilitic eruption, which yielded to their prescriptions, unaided by mercury, these two cases have satisfied me that every attention is due to the exactness and discernment of these respectable individuals; and if I hesitated until I saw with my own eyes, and judged with my own understanding, I claim for my own observations no larger a measure of faith from others." And he afterward adds, "In thus relinquishing my opinion, that true syphilis differs from other venereal complaints, by always requiring mercury for its cure, it is necessary to reduce the doctrine I hold to this proposition: that with respect to the use of that medicine, it differs from them only in not being injured, but decidedly benefited by it in all its symptoms and stages." (*P.* 218, 219.)

According to Mr. Hunter, there are three ways in which chancres may be produced: first, by the poison being inserted into a wound; secondly, by being applied to a non-secreting surface; and, thirdly, by being applied to a common sore. A wound, it seems, is much more readily infected than a sore. To whichever of these three different surfaces the pus is applied, it produces its specific inflammation and ulceration, attended with a secretion of pus. The matter produced in consequence of these different modes of application, he says, partakes of the same nature as the matter which was applied, because, he observes, the irritations are alike. How the alleged examples of very different primary sores being sometimes communicated by the application of the matter of chancre, are to be reconciled with the Hunterian doctrines, it is difficult to suggest, unless Mr. Carmichael's observation about the present excessive rarity of the true syphilitic chancre, can furnish the explanation. However, as far as I can believe my own eyes and judgment, I now see in London the same forms of chancre, which used to prevail during my apprenticeship at St. Bartholomew's Hospital more than twenty years ago. And if any difference can be particularized, it is only that which depends upon their being less rarely converted into worse diseases than mere syphilitic ulceration, by the dreadful effects of immoderate courses of mercury.

With respect to the three modes, in which Mr. Hunter speaks of the venereal poison being applied and taking effect, I know not why he should have altogether excluded secreting surfaces; for of this nature (as a late writer remarks) are the glans penis and corona glandis, (*Bacot on Syphilis, p.* 65,) and of a similar kind, are the insides of the labia, the surfaces of the nymphæ, &c. where sores are common enough. Whatever may be the truth of the impossibility of the formation of chancres within the urethra, the latter considerations certainly tend to prove that the secreting nature of its membrane, is not the only reason for the alleged fact.

I shall not here detain the reader with

descriptions of the primary ulcer with elevated edges, the phagedenic, and the sloughing chancre. Such descriptions I have embodied in the last edition of the First Lines of Surgery, with the sentiments of Mr. Carmichael, respecting the train of constitutional symptoms, appertaining, as he believes, to each form of ulcer. It is an interesting disquisition, but as far as my observations and inquiries go, it has not yet reached any degree of certainty or precision; and as I have already explained, the reports published by other gentlemen engaged in this investigation, do not by any means confirm the much desired intelligence, that such progress has been made in the knowledge of all the diversified symptoms of the venereal disease, that its varieties can now be classed both in regard to the primary ulcers, and the secondary symptoms connected with each description of chancre.

I firmly believe, that with respect to all the appearances of this disease, both in its primary and secondary forms, a vast deal depends upon constitution, independently of the nature of the virus. And I adopt this opinion, at the same time that many reflections, already hinted at in this article, lead me to join in the belief, that syphilitic diseases may depend upon a variety of poisons, whereby some of the perplexity of these cases may be explained.

The local, or immediate effects of the venereal disease, are seldom wholly specific; but are usually attended both with the specific and constitutional inflammation. Hence, Mr. Hunter advises particular attention to be paid to the manner in which a chancre first appears, and to its progress. If the inflammation spreads in a quick and considerable way, the constitution must be more disposed to inflammation, than natural. When the pain is severe, Mr. Hunter remarks, there is a strong disposition to irritation. Chancres, also, sometimes soon begin to slough, there being a strong tendency to mortification.

It is also observed by Mr. Hunter, that when there is a considerable loss of substance, either from sloughing or ulceration, a profuse bleeding is no uncommon circumstance, more especially, when the ulcer is on the glans. The adhesive inflammation does not appear to take place sufficiently to unite the veins of this part of the penis, so as to prevent their cavity from being exposed, and the blood escapes from the corpus spongiosum urethræ. The ulcers, or sloughs, often extend as deeply as the corpus cavernosum penis, and similar bleedings are the consequence.

With respect to chancres in women, the labia and nymphæ, like the glans penis in men, are subject to ulceration, and the ulcerations are generally more numerous in females than males, in consequence of the surface on which the sores are liable to form being much larger. As Mr. Hunter observes, chancres are occasionally situated on the edge of the labia; sometimes on the outside of these parts; and even on the perinæum. When the sores are formed on the inside of the labia or nymphæ, they can never dry or scab; but when they are externally situated, the matter may dry on them, and produce a scab, just as happens with respect to chancres situated on the scrotum, or body of the penis.

Mr. Hunter remarks, that the venereal matter from these sores is apt to run down the perinæum to the anus, and excoriate the parts, especially about the anus, where the skin is thin, and where chancres may be thus occasioned.

Chancres have been noticed in the vagina; but Mr. Hunter suspected that they were not original ones; but that they had spread to this situation from the inside of the labia.

Before any of the virus has been taken up by the absorbents, and conveyed into the circulation, a chancre is entirely a local affection. From the Hunterian doctrines, however, it would appear that absorption must generally soon follow the occurrence of the sore; and all the modern opinions concerning the nature of ulceration itself, would lead to the same inference. When no secondary symptoms take place after the cure of chancre without mercury, I believe few surgeons of the present day would attempt to account for the fact by the hypothesis of the matter not having been absorbed; and this observation is made with every disposition on my part to express my assent to the truth of another circumstance, viz. that some persons appear much more susceptible of the effects of the venereal disease than other individuals. It is remarked by Mr. Hunter, that the interval between the application of the poison, and its effects upon the parts is uncertain; but that on the whole, a chancre is longer in appearing, than a gonorrhœa. However, the nature of the parts affected makes some difference. When a chancre occurs on the frænum, or at the termination of the prepuce in the glans, the disease in general comes on earlier; these parts being more easily affected than either the glans penis, common skin of this organ, or the scrotum. He adds, that in some cases, in which both the glans and prepuce were contaminated from the same application of the poison, the chancre made its appearance earlier on the latter part. Mr. Hunter knew of some instances in which chancres appeared twenty-four hours after the application of the matter; and others, in which an interval of seven weeks, and even two months elapsed between the time of contamination, and that when the chancre commenced. However, here, as in almost all other statements about this perplexing subject, we never know with certainty that the writer has sufficient grounds for the assumed fact, that it is only one kind of poison which is spoken of.

TREATMENT OF CHANCRES.

It was one of Mr. Hunter's opinions, that the ulceration arising from venereal inflammation, generally, if not always, continues till cured by art, and his theoretical reason for this circumstance was, that as the inflammation in the chancre spreads, it is always attacking new ground, so as to produce a succession of irritations, and hinder the disease from curing itself.

It was no doubt the foregoing opinion of Mr. Hunter, which formed the authority for the position which was always forcibly insisted upon in the surgical lectures which I attended some years ago in London, viz. that all venereal complaints, when not counteracted by remedies, invariably grow progressively worse and worse. But modern experience apprizes us, that this doctrine is far from being correct. As I have noticed in the foregoing pages, Mr. Fergusson assures us, that in Portugal, the disease in its primary state among the natives is curable without mercury, and by simple topical treatment; that the antisyphilitic woods, combined with sudorifics, are an adequate remedy for constitutional symptoms; and that the virulence of the disease has there been so much mitigated, that after running a certain course (commonly a mild one) through the respective orders of parts, according to the known laws of its progress, *it exhausts itself, and ceases spontaneously*. (See *Med. and Chir. Trans. Vol.* 4, *p.* 2—5.) In the third edition of the *First Lines of the Practice of Surgery*, it was sufficiently proved, from several conclusions drawn from the writings of Mr. Pearson, (*Obs. on the Effects of Various Articles in the Cure of Lues Venerea*,) that venereal sores might be benefited, and even healed under the use of several inert insignificant medicines. And as I have previously explained, the possibility of curing chancres and other venereal complaints, without mercury, was long since remarked by Dr. Clutterbuck, who thence very justly inferred, that the healing of a sore without this remedy was no test that it was not venereal. (See *Remarks on the Opinions of the late John Hunter*, 1799.)

But although the whole history of the venereal disease, and of the various articles of the materia medica, if carefully reflected upon, must have led to the same conclusion, the truth was never placed in such a view as to command the general belief of all the most experienced surgeons in this and other countries of Europe. I do not mean to say, that the truth was not seen and remarked by several of the older writers; for that it was so any man may convince himself by referring to several works, quoted in the course of this article. But it is to be understood, all indecision could never be renounced, as long as prejudices interfered with the only rational plan which could be adopted, with the view of bringing the question to a final settlement; I mean experiments on a large and impartial scale, open to the observation of numerous judges, yet under such control as insured the rigorous trial of the practice. Nor could such investigation be so well made by any class of practitioners as the army surgeons, whose patients are numerous, obliged to follow strictly the treatment prescribed, without any power of going from hospital to hospital, or from one surgeon to another, as caprice may dictate, or of eluding the observation of the medical attendants after a seeming recovery. And here I must take the opportunity of stating, that as far as my judgment extends, the most important and cautious document yet extant on the two questions of the *possibility* and *expediency* of curing the venereal disease without mercury, is the paper of Mr. Rose. For let it not be presumed, that because the army surgeons find the venereal disease curable without mercury, they mean to recommend the total abandonment of that remedy for the distemper, any more than they would argue that *possibility* and *expediency* are synonymous terms. At the time when Mr. Rose published his observations, he had tried the non-mercurial treatment in the Coldstream Regiment of Guards, during a year and three quarters, and had thus succeeded *in curing all the ulcers on the parts of generation which he met with in that period, together with the constitutional symptoms to which they gave rise.* "I may not be warranted in asserting, (says this gentleman,) that many of these were venereal, but undoubtedly a considerable number of them had all the appearances of primary sores, produced by the venereal virus, and arose under circumstances, where there had been at least a possibility of that virus having been applied. *Admitting that there is nothing so characteristic in a chancre, as to furnish incontrovertible proof of its nature*, it will yet be allowed, that there are many symptoms common to such sores, although not entirely peculiar to them, and whenever these are met with, there are strong grounds to suspect, that they are the effects of the syphilitic virus. In a sore, for instance, appearing shortly after suspicious connexion, where there is loss of substance, a want of disposition to granulate, and an indurated margin and base, there is certainly a probability of that poison being present. Among a number of cases of such a description, taken indiscriminately, the probability of some being venereal is materially increased, and must at last approach nearly to a certainty. On this principle some of the sores here referred to, must have been venereal. They were also seen by different surgeons, on whose judgment I would rely, who agreed in considering many of them as well marked cases of true chancre." (*Rose in Med. Chir. Trans. Vol.* 8, *p.* 357, *&c.*) The men thus treated, were examined almost every week, for a considerable time after their apparent cure, "both that the first approach of constitutional symptoms might be observed, and that any deception from an underhand use of mercury might be guarded against." (*P.* 359.) Sixty cases of ulcers on the penis were also cured by Mr. Dease, in the York Hospital, by means of simple dressings, the only general remedy being occasional purgatives. The practice was likewise extensively tried by Mr. Whymper and Mr.

Good, surgeons of the Guards, with the same kind of success. In Mr. Rose's practice, all idea of specific remedies were entirely laid aside. The patients were usually confined to their beds, and such local applications were employed, as the appearances of the sores seemed to indicate. Aperient medicines, antimony, bark, vitriolic acid, and occasionally sarsaparilla, were administered. (*P.* 363.) "*Upon an average* (says Mr. Rose) *one out of every three of the sores thus treated, was followed by some form or other of constitutional affection:* this was in most instances mild, and sometimes so slight, that it would have escaped notice, if it had not been carefully sought for. The constitutional symptoms were evidently not such as could be regarded as venereal, if we give credit to the commonly received ideas on the subject. *Caries of the bones,* and some of the least unequivocal symptoms, did not occur. In no instance was there that uniform progress, with unrelenting fury, from one order of symptoms and parts affected to another, which is considered as an essential characteristic of true syphilis." (*Med. Chir. Trans. Vol.* 8, *p.* 422.) The constitutional symptoms also yielded, without the aid of mercury, and frequently primary sores, corresponding to what had been called the true chancre, with indurated base, were cured in this manner, yet were followed by no secondary symptoms. We are also informed, that "several cases occurred of a cluster of ill-conditioned sores over the whole inner surface of the prepuce, and behind the corona glandis; and also of a circle of small irritable sores, situated on the thickened and contracted ring at the extreme margin of the prepuce. These occasionally produced buboes." *None of the sores of this description met with by Mr. Rose, were followed by any constitutional affection.* (*Vol. cit. p.* 370.) He bears testimony to the ill effects of mercury and stimulants in cases of phagedenic ulcers, and confirms a not uncommon opinion, that they are seldom followed by secondary symptoms, which opinion should be qualified with the condition mentioned by Mr. Guthrie, (*Med. Chir. Trans. Vol.* 8, *p.* 565.) that no mercury be given. Lastly, as I have already stated, Mr. Rose observed, that most of the cases of papular eruptions followed ulcers, which were not very deep, and healed without much difficulty. (*P.* 399.)

Although the fact of the *possibility* of curing every kind of ulcer on the genitals, without mercury, is now so fully confirmed by the statements of Mr. Guthrie, (*Med. Chir. Trans. Vol.* 8, *p.* 558, and 576.); Dr. I. Thomson, (*Edinb. Med. and Surg. Journ. for January,* 1818;) Dr. Hennen, (*Op. cit. Nos.* 54 *and* 55, *and Principles of Military Surgery, Ed.* 2.); Mr. Bacot, (*On Syphilis, p.* 26, *&c.*); and many other careful observers, and it is of great importance in relation to the removal of an erroneous doctrine concerning the diagnosis, the *expediency* of the practice must evidently be determined by other considerations, the principal of which are the comparative quickness of the cures effected with, and without mercury; the comparative severity and frequency of secondary symptoms; and the generally acknowledged fact, that a syphilitic primary sore is not indicated with any degree of certainty by its mere external character, or indeed any other criterion, that I know of.

Respecting the comparative quickness of the cures of chancres, or reputed chancres, without the aid of mercury, much disagreement prevails in the different reports, even those collected by the same individuals, whose statements must therefore be deemed perfectly impartial, though inconclusive. (See *Hennen's Military Surgery, Ed.* 2, *p.* 536, *&c.*) Some of Mr. Rose's best marked cases of chancre, that is to say, such as were distinguished by the indurated base and circumference, healed in a very short time. But even respecting these, or any other kinds of chancre, no regularity on this point can be found. Mr. Guthrie observes, if the "ulcers were not without any marked appearance, and did not amend in the first fortnight, or three weeks, they generally remained for five, or seven weeks longer; and the only difference in this respect between them and the raised ulcer of the prepuce was, that this often remained for a longer period, and that ulcers, possessing the true characters of chancre, required in general a still longer period for their cure, that is, from six, eight, to ten, twenty, and even in one case, twenty-six weeks, healing up and ulcerating again on a hardened base. Those that required the greatest length of time had nothing particular in their appearance, that would lead us to distinguish them from others of the same kind, that were healed in a shorter time." (*Med. Chir. Trans. Vol,* 8, *p.* 558.) The same writer afterward expresses his belief, that almost all the protracted cases would have been cured in one half, or even one-third of the time, if a moderate course of mercury had been resorted to.

In relation to the question before us, one of the most important documents which I met with, is an official circular, signed by Sir James M'Grigor and Dr. Franklin, from which it appears, that in 1940 cases of primary venereal ulcerations on the penis, *cured without mercury,* between December, 1816, and December, 1818, (including not only the more simple sores, but also a regular proportion of those with the most marked character of syphilitic chancre) the average period taken up by the treatment, when bubo did not exist, was 21 days, ; with bubo, 45 days. (See *Hennen's Military Surgery, Ed.* 2, *p.* 545.) And it further appears, that during the period above specified, 2827 chancres, a more considerable proportion of which were probably Hunterian chancres, were treated with mercury, and that the average period required for the cure, when there was no bubo, was 33 days; with bubo, 50. As far therefore as a judgment can be formed from this official estimate, and no calculation is ever likely to be furnished on a larger, or more impartial scale, the evidence tends to prove, that primary sores may generally be cured rather sooner without, than with, the administration of mercury. But, as practitioners are not obliged to restrict themselves either to the mercurial, or non-mercurial practice, I am of opinion, that the total rejection of mercury is by no means justified by any facts, yet before the public, concerning the time requisite for the cure on either plan, because, as it is universally admitted, that *some* cases are very tedious, unless mercury be given, neither reason nor experience will sanction the exclusive adoption of only one mode of practice, whether the backwardness to heal exist, or not. On the contrary, as far as the consideration of time has weight, prudence and common sense teach us to diversify the treatment according to circumstances. But it may be inquired, since the backward disposition of a sore to heal cannot be known at first by its mere appearance, should the treatment begin with mercury, or not? Now, although late writers dwell very much on the impossibility of judging of the nature of a sore by its look alone, one fact is certain, that some ulcers on the penis have a clean appearance from their very commencement; some cases are simple excoriations; and others, though ill-conditioned, are so small, that a fair chance offers itself of destroying every part of the disease with caustic. In all such cases, I should never commence with mercury. With respect to phagedenic and sloughing chancres, repeated experience has convinced me that they are cases, in the first stage of which, at all events, mercury should always be avoided; and I believe with Mr. Guthrie, that when this is strictly done, secondary symptoms are rare. One sore of this kind was long ago pointed out by Mr. Pearson as not requiring mercury; and the attention of surgeons has been of late particularly directed to it by Mr. Bacot. "It is characterized by a great derangement of the general health, by a high state of inflammation of the part, by great local pain, and proceeds rapidly to the destruction of the parts. The situation of this sore is most commonly in the angle between the prepuce and glans penis; and those of a full habit of body, the young and the vigorous, are most liable to its attack. The most prompt and vigorous antiphlogistic means are necessary to arrest the progress of this sore; and the blood, taken away in these cases, presents the usual inflammatory appearances, frequently in a very high degree. The exhibition of mercury in this species of sore is highly mischievous, and productive of the worst consequences; nor does it often happen that secondary symptoms succeed, &c. (*On Syphilis, p.* 57.) Here, according to Mr. Pearson's observations, made many years ago, mercury is not perhaps necessary for the security of the constitution; but, I conceive, it might be more correct to say, that the safety of the constitution actually requires that mercury should be strictly avoided, because there is some ground for believing, that in these instances, it is not only injurious to the local disease, but conducive to secondary symptoms. However, if the latter symptoms should arise, notwithstanding mercury has not been administered during the cure of the ulcer, alterative doses of that medicine may still be useful, as Mr. Carmichael observes, when the disease is in the wane, but not until then; previously to which period, the best internal remedies are antimonials, sarsaparilla, guaiacum, compound powder of ipecacuanha, arseniate of kali, the nitrous acid, and nitro-muriatic bath. (See *Obs. on the Symptoms, &c. of the Venereal Disease, p.* 209.)

With respect to chancres, with a hardened base and margin, it certainly appears that many of them have healed tolerably fast without mercury; but a large proportion of them seem to be tedious when that medicine is not employed. (See three cases recorded in the work last quoted.) It may be thought, however, that the official document, circulated by Sir James M'Grigor and Dr. Franklin, tends to prove, that, at all events, these sores heal sooner without than with mercury. But this deduction seems hardly allowable; because, as these faithful and impartial reporters have sensibly remarked, the 2827 sores, treated with mercury, may be fairly presumed to have partaken of the character of Hunter's chancre, in a greater proportion than the 1940 primary sores treated without mercury. (See *Hennen's Military Surgery, p.* 545.) Consequently, though the sores treated with mercury seem, on the average, to have healed more slowly than others treated with it; yet it is to be taken into the account, that a larger number of the first cases were ulcers with a hardened base and margin, and that if they had not had the mercurial treatment extended to them, it is possible their complete cure might generally have been still more tedious. As the evidence now stands, therefore, I conceive it right to employ mercury with moderation for all sores on the penis, having the characters of the Hunterian chancre, and appearing after a suspicious connexion.

A consideration, however, which ought to have greater influence than the slowness or quickness of the treatment of primary sores, with and without mercury, is the question, whether, upon the average, secondary symptoms are more frequent after the non-mercurial practice, than the other? On this most interesting point, the reports vary, as indeed they do on almost every matter in the investigation, excepting the facts of the possibility of curing all forms of the venereal disease without mercury, the great rarity of any affection of the bones, and the general mildness of the secondary symptoms, when that medicine is not employed. On all these points, the testimonies are strong and convincing. But while Mr. Rose found secondary symptoms take place in one-third of his cases treated without mercury, (*Med. Chir.*

Trans. Vol. 8, *p.* 222,) the proportion in the York, and some other hospitals, was only about one-tenth. (*Vol. cit. p.* 559.) In the 1940 cases of primary sores on the penis, treated without mercury in the army hospitals, between Dec. 1816, and Dec. 1818, there were only 96 instances of secondary symptoms of different sorts, or not more than one-twentieth. But the proportion of cases of secondary symptoms in the case of primary ulcers, treated with mercury, was still smaller, and this in an important degree, being only 51 out of 2827 cases, or about one-fifty-fifth. Were it not necessary here to make a considerable allowance for the probable circumstance of the Hunterian chancre prevailing most in the cases treated with mercury, a point admitted by Sir James M'Grigor and Dr. Franklin, we should here have a powerful and decisive evidence in favour of the general superiority of mercury for the prevention of secondary symptoms. Nor am I certain that the conclusion can be much weakened by the probability of the difference here alluded to, because, from the evidence of late brought to light respecting the nature of the class of diseases which go under the name of syphilis, we have no right to infer, that what has been called the true, or Hunterian chancre, is more disposed than some other primary sores to occasion secondary symptoms. Indeed, Mr. Guthrie declares, in the cases referred to in his paper, that where mercury was not used, these symptoms more frequently followed the raised ulcer of the prepuce, than the true characteristic chancre of syphilis affecting the glans penis. (*Med. Chir. Trans. Vol.* 8, *p.* 577.) On the whole, as the reports now stand, and as far as I can judge from cases which I have seen myself, the secondary symptoms are more frequent when primary ulcers are promiscuously treated without mercury. But it by no means follows from this fact, that the way to have the smallest possible number of cases of secondary symptoms, is to employ mercury in all instances of sores on the genitals. This both reason and experience contradict, inasmuch as mercury, given in cases which do not require it for the security of the constitution, is frequently itself a source of cutaneous diseases, sore throats, and nodes, which, without its baneful influence, would never have occurred. The prudent course seems here to be, to exercise our judgment and discretion, and to be guided in some measure by the appearance and progress of the sore, according to principles already suggested; for though the look of a sore may not, in the present state of our knowledge, always enable us to form a certain inference respecting the risk of secondary symptoms, if mercury be omitted, it cannot be said, that the danger would be positively obviated by having recourse at once to mercury in every kind of primary sore, and notwithstanding every thing which has been lately published, I still flatter myself, that surgeons, accustomed to see much of venereal cases, can yet distinguish excoriations, boils, simple healthy sores, and some other similar ailments, (see *Evans on Ulcerations of the Genital Organs*, 8*vo. Lond.* 1819,) from ulcers, by which the constitution is liable to be affected. Until further data exist, I cannot venture to lay down other directions about the treatment of primary sores. It is with pleasure, however, that I subjoin the advice of other gentlemen, whose sentiments and talents deserve respect, though their opinions may not exactly agree with my own. "In every primary ulcer, (says Dr. Hennen,) I would give up the idea of using mercury at first, treating it as if it were a simple ulceration, by cleanliness, rest, and abstinence, and applying to it the most simple, and mildest dressings. If the sore did not put on a healing appearance in a reasonable time, the extent of which must depend upon the circumstances of the patient, I should make use of more active dressings. But if, beyond all calculation, it remained open, I should certainly not sacrifice every consideration to a dislike of mercury, knowing how many persons have been seriously benefited by a judicious and mild administration of that remedy." (*On Military Surgery, Ed.* 2, *p.* 518.) When primary ulcers resist common means a certain time, Mr. Bacot would also have recourse to mercury. (*On Syphilis, p.* 69.) Like me, however, the latter author does not approve of invariably postponing that remedy, until the latter criterion, viz. the backwardness of the sore to be healed by other methods, is afforded.

Whenever the employment of mercury in this work is recommended, I am very far from wishing to be thought an advocate for *pushing* that medicine, as the phrase is. On the contrary, experience has fully convinced me, that in no forms of chancre, nor in any other stages of the venereal disease, is it proper to exhibit mercury in the unmerciful quantity, and for the prodigious length of time, which custom, ignorance, and prejudice, used to sanction in former days. Violent salivations, at all events, ought to be for ever exploded.

When I was an apprentice at St. Bartholomew's Hospital, most of the venereal patients in that establishment were seen with their ulcerated tongues hanging out of their mouths; their faces prodigiously swelled; and their saliva flowing out in streams. The wards were not sufficiently ventilated, and the stench was so great, that the places well deserved the appellation of *foul.* Yet, notwithstanding mercury was thus *pushed*, (as the favourite expression was,) it was then common to see many patients suffer the most dreadful of mutilations, in consequence of sloughing ulcers of the penis; other patients whose noses and palates were lost; others who were covered with nodes and dreadful phagedenic sores.

Happily, at the present day, this attachment to violent salivations no longer prevails; simple excoriations and common ulcers are more attentively discriminated; and even in what are reputed to be true syphilitic chancres, mercury is seldom given, except in very moderate doses, or such quantities as only gently affect the gums and salivary glands. The surgeon, now no longer blinded with the continual fear of the rapid and furious progress of syphilis when not duly unresisted by mercury, avoids the very mode of practice which was itself the cause of all the aggravated forms of the disease. The consequence is, that very bad instances of the ravages of lues venerea are now hardly ever observed in the above hospital, and the few aggravated cases which are met with, are generally in that state previously to their admission. Another benefit, also resulting from modern investigations, which proves that chancres, and all other varieties of the venereal disease, do not *absolutely* require mercury for their cure, is the safety with which it is now known that the use of such medicine may be postponed, where the patient's present state of health would not well bear its exhibition. And I know, that an ignorance of this fact has formerly caused the death of many a poor sufferer.

The greater present mildness of syphilitic diseases in England, I ascribe chiefly to the more judicious treatment now adopted, and not to any change or modification in the nature of the disorder. There are others, however, who may think as Mr. Fergusson does with regard to syphilis in Portugal, that the disease has exhausted a great deal of its virulence from long continuance among us. But before we are altogether justified in drawing such a conclusion, we must forget all the bad practice which prevailed in former days, and which, in my opinion, is sufficient to account for the more severe forms in which syphilis then presented itself.

According to Mr. Hunter's ideas, the most simple method of treating a chancre is to extirpate it with caustic, or the knife, whereby it is reduced to the state of a common sore, or wound, and heals up as such. However, he sanctions this practice only on the first appearance of the chancre, when the surrounding parts are not yet contaminated; for, he says, it is absolutely necessary to remove the whole of the diseased part, and this object is exceedingly difficult of accomplishment, when the disease has spread considerably. When the chancre is situated on the glans penis, he thought touching the sore with the lunar caustic preferable to cutting it away, because the hemorrhage from the cells of the glans would be considerable after the use of the knife.

The caustic should be pointed at the end like a pencil, in order that it may only touch such parts as are really diseased; and its application should be repeated till the surface of the sore, after the separation of the last sloughs, assumes a red and healthy appearance, when it will heal, like any other sore made with caustic.

When the sore is on the prepuce, or the common skin of the penis, and in an incipient state, the same practice may be adopted with success. When the chancre is large, however, it cannot be destroyed with the argentum nitratum, which does not extirpate the increasing sore deeply enough. In such cases, Mr. Hunter thought that the potassa cum calce might answer better. When the caustic could not be conveniently employed, this author sometimes recommended the excision of chancres, a plan which he had adopted himself, and the part afterward healed with common dressings. However, says he, as our knowledge of the extent of the disease is not always certain; and as this uncertainty increases with the size of the chancre, the cure must be in some measure promoted by proper dressings, and it will be prudent to dress the sore with mercurial ointment. When a chancre is destroyed almost immediately on its first appearance, Mr. Hunter believes that there is little danger of the constitution being infected, as it is reasonable to conclude that there has not been time for absorption to take place. However, on account of the impossibility of being certain on this point, he recommends mercury to be given from motives of prudence, the quantity of which medicine, he says, should be proportioned to the duration and progress of the sore. When the chancre is large, Mr. Hunter deems mercury *absolutely necessary*, and he conceives that very little good is to be done by the extirpation.

With respect to dressings for chancres, Mr. Hunter seems to have placed a good deal of confidence in those which contain mercury; but I do not believe that the same attachment to them prevails now which existed twenty years ago. And the established fact of mercury not being *absolutely* necessary in any way for the cure of different venereal sores, must have the effect of removing some prejudices on this part of the subject. As common mercurial ointment is always more or less rancid, I have found it in many cases a bad kind of dressing; and now never apply it to ulcerated surfaces. In ordinary cases, I believe astringent lotions made with the sulphate of copper, acetate of lead, alum, &c. answer the best. Some chancres are indolent, and require stimulants, like the hydrargyri nitrico-oxydum blended with ointment, the unguentum hydrargyri nitrati more or less weakened, or a solution of the nitrate of silver. Mr. Hunter, always partial, even in cases of indolent chancres, to mercurial dressings, expresses his preference to a salve containing calomel, as being more active than common mercurial ointment. In phagedenic and sloughing chancres, the carrot and fermenting poultices, solutions of the extracts of hemlock and opium; but particularly bread and water poultices with opium, and lotions of the arseniate of kali, nitrous acid, and nitrate of silver, merit trial.

In general, Mr. Hunter was an advocate for changing the dressings very often, because the matter separates them from the sore, so as to diminish their effects. He states, that changing the applications thrice a day, will not be found too often, particularly when they are in the form of an ointment.

When the venereal nature of a chancre is removed, the sore frequently becomes stationary, in which case Mr. Hunter observes, that new dispositions have been acquired; and the quantity of disease in the part has been increased. When chancres are only stationary, Mr. Hunter says, they may often be cured by touching them slightly with the lunar caustic. In these cases, no cicatrization seems possible, till the contaminated surface, or the new flesh which grows on that surface, has either been destroyed or altered. When sores are situated under the prepuce, where they are concealed by a phymosis, some emollient, or gently astringent lotion, should frequently be injected under the fore-skin, so as to wash out any matter which might otherwise lodge there, and cause additional irritation.

Contrary to the doctrines, which the facts of modern experience have now fully established, Mr. Hunter believed, that *mercury should be given in every case of chancre*, however slight, and even when it has been destroyed by caustic, or other means, on its very first appearance. *The remedy*, he says, *should be continued for some time after the chancre has healed, in order to hinder the venereal disposition from forming.* Here we find even Hunter himself falling into some inconsistencies; for, in other parts of his work, he seems to approve of the principle of giving mercury only when actual and visible disease exists, because it cannot cure the disposition to it, even if it exists. Now, though the chancre is cured, no further absorption of the virus from it is possible, and whatever *disposition* to the disease can arise from absorption, must have already been formed, and therefore cannot be prevented, and, according to Mr. Hunter's own theory, the virus has been long ago expelled from the system, together with some of the excretions, mercury is recommended with the view of protecting the constitution. However, if Mr. Hunter's explanations are not altogether satisfactory on this part of the subject, I believe the fault is in his theory, because, in cases where mercury is deemed adviseable, general experience appears to sanction the practice of continuing its use for some time after the chancre is perfectly healed. Yet many exceptions to this rule present themselves; for, if a chancre is large, and very long in healing, its syphilitic character is generally extinct a good while before cicatrization is completed, and perseverance in mercury under these circumstances would be both an absurd, and a dangerous practice.

Hence, in a great measure, the cause of the numerous instances of the *mercurial* disease, as Mr. Mathias has named it, and which, in former days, did far more mischief than syphilis itself. (See *An Inquiry into the History and Nature of the Disease, produced in the Human Constitution by the Use of Mercury, 3d Ed 8vo. Lond.* 1816.) This part of the subject is noticed by Mr. Hunter, who states, that in very large chancres, it may not always be necessary to continue either the external or internal administration of mercury till the sore is healed; for the venereal action is just as soon destroyed in a large chancre, as it is in a small one, since every part of the sore is equally affected by the medicine, and, of course, cured with equal expedition. But, in regard to cicatrization, circumstances are different, because a large sore is longer than a small one in becoming covered with skin. Hence, according to Mr. Hunter, a large chancre may be deprived of its venereal action, long before it has healed; while, on the other hand, a small one may heal before the syphilitic affection has been destroyed. In the latter case, he represents it as most prudent, both on account of the chancre and constitution, *to continue the employment of mercury a little while after the sore is healed;* advice which, as I have already stated, is at variance with certain parts of his own theory, however well justified it may be by experience.

As Mr. Hunter has explained, chancres both in men and women often acquire, during the treatment, new dispositions, which are of various kinds, some retarding the cure, and leaving the parts in an indolent thickened state, after the cure is accomplished. In other instances, a new disposition arises, which utterly prevents the parts from healing, and often produces a much worse disease than that from which it originated. Such new dispositions may lead to the growth of tumours. They are more frequent in men than women, and generally occur only when the inflammation has been violent from some peculiarity of the parts, or constitution. They have sometimes been considered as cancerous.

Among the diseases in question, Mr. Hunter notices those continued, and often increased inflammations, suppurations, and ulcerations, which become diffused through the whole prepuce, and also along the common skin of the penis, which becomes of a purple hue, attended with such a general thickening of the cellular membrane, as makes the whole organ appear considerably enlarged. The same writer observes, that the ulceration on the inside of the prepuce will sometimes increase, and run between the skin and the body of the penis, and eat holes through different places, till the whole is reduced to a number of ragged sores. The glans often shares the same fate, till more or less of it is gone. Frequently, the urethra in this situation is wholly destroyed by ulceration, and the urine is discharged some way farther back. The ulceration, if unchecked, at length destroys all the parts. In this acute case, prompt relief is demanded; but often the proper mode of treatment cannot be at once determined, owing to our ignorance in respect to the exact nature of the peculiar cause of the disease. Mr. Hunter states, that the decoction of sarsaparilla is often of service, when given in large quantities; and that the extract of hemlock, and sea-bathing, are sometimes capable of effecting a cure. According to my own experience, the omission of mercury is here the most essential thing.

Sometimes after a chancre has healed, the cicatrix breaks out again, and puts on the appearances of the preceding sore. Occasionally, similar diseases break out in different places from that of the cicatrix. Mr. Hunter believes, that they differ from a chancre in generally not spreading so fast, nor so far; in not being so painful, nor so much inflamed; in not having such hard bases as venereal sores have; and in not producing buboes. This writer is of opinion, that they are not venereal, and he states, that they are very apt to recur.

Mr. Hunter does not specify any particular mode of cure for all these cases; but he mentions one instance, which seemed to be cured by giving forty drops of the liquor potassæ, every evening and morning, in a basin of broth; and he adverts to another case, which was permanently cured by sea-bathing.

In some instances, after a chancre has healed, the parts, as Mr. Hunter remarks, do not ulcerate; but appear to become thickened and indurated. Both the glans and prepuce seem to swell, so as to form on the end of the penis a tumour, or excrescence, shaped very much like a cauliflower, and when cut into, showing radii, running from its base, or origin, towards the external surface. It is extremely indolent, and not always a consequence of the venereal disease; for Mr. Hunter has seen it arise spontaneously.

No medicine seems to be at all likely to cure the disease; the only successful means is to amputate a considerable part of the penis, and then to keep a proper catheter introduced in the urethra.

Another disposition, induced by the previous occurrence of chancres, is that to excrescences, or cutaneous tumours, called warts. These are frequently considered not simply as a consequence of the venereal poison, but as possessed of its specific disposition, and therefore, says Mr. Hunter, surgeons have recourse to mercury for the cure of them; and it is said, that such treatment often removes them. This eminent practitioner never saw mercury produce this effect, although the medicine was given in sufficient quantity to cure recent chancres, and a lues venerea, in the same person. (See *Wart.*)

Mr. Hunter takes notice of sloughs, which occur in the tonsils, from the effect of mercury on the throat, and are apt to be mistaken for venereal complaints. He also mentions that, sometimes, when the original chancre has been doing well, and been nearly healed, he has seen new sores break out on the prepuce, near the first, and assume all the appearance of chancres.

When, in the treatment of chancres, a bubo arises, while the constitution is under the influence of a sufficient quantity of mercury to cure such sores, which medicine has also been rubbed into the lower extremity, on the same side as the bubo, Mr. Hunter suspects, that the swelling in the groin is not venereal, but is produced by the mercury. In these cases, he always preferred conveying mercury into the system in some other manner.

With respect to the treatment of chancres in women, since it is difficult to keep dressings on the parts, Mr. Hunter advises the sores to be frequently washed with some mercurial solution, and speaks of one made with oxymuriate of mercury, as perhaps being the best, since it will act as a specific, and stimulant also, when this is requisite. When the chancres, however, are irritable, they are to be treated in the same manner as similar complaints in men. When the sores extend into the vagina, this passage must be kept from becoming constricted, or closed by the introduction of lint.

Sometimes, after a chancre and all venereal disease are cured, the prepuce continues thickened and elongated, so that the glans cannot be uncovered. Perhaps, the case is often without remedy. Mr. Hunter, however, very properly recommends trying every possible means, and he informs us, that the steam of warm water, hemlock fomentations, and cinnabar fumigations, are frequently of singular service.

When the thickening and enlargement of the prepuce cannot be removed by applications, all the portion, anterior to the glans penis, may be cut away. (See *Phymosis.*)

Bubo. The immediate consequence of a chancre, which is called a bubo, and also the remote effects, implied by the *constitutional, or secondary symptoms*, arise from the absorption of recent venereal matter from some surface, where it has either been applied or formed.

We are already aware, that Mr. Hunter believed the matter of gonorrhœa to be capable of communicating the venereal disease. Hence, he explains in the following terms, the three ways in which he thought a bubo might arise in consequence of absorption. He observes, that the first and most simple manner, is when the matter, either of a gonorrhœa, or chancre, has only been applied to some sound surface, without having produced any local effect on the part; but has been absorbed, immediately after its application. Mr. Hunter affirms, that he has seen instances of this kind, though he confesses that they are very rare, and that, in most cases apparently of this nature, a small chancre may be found to have existed.

The second mode of absorption, or that taking place in a gonorrhœa, Mr. Hunter represents as more frequent. That secondary symptoms do occasionally follow gonorrhœa is yet commonly admitted, though whether they differ essentially from those which follow true chancres, is a point not yet completely settled. However, as far as Mr Carmichael's experience goes, there is a difference, a part of which consists in the eruption being of the papular kind, as it is also after many instances of simple primary ulcers. (See *Obs. on the Symptoms, &c. of Venereal Diseases, 8vo. Lond.* 1818.)

The third mode is the absorption of matter from an ulcer, which may either be a chancre, or a bubo. This mode is by far the most common, and it proves, with many other circumstances, that a sore, or ulcer, is the most favourable for absorption. Mr. Hunter believed, that absorption was more apt to take place from sores on the prepuce, than those on the glans.

A fourth mode of absorption from a wound is also an occasional occurrence.

Mr. Hunter notices, that what is now commonly understood by a bubo, is a swelling, taking place in the absorbing system, especially in the glands, and arising from the absorption of some poison, or other irritating matter. When such swellings take place in the groin, they are called buboes, whether they proceed from absorption or not.

Mr. Hunter regards every abscess in the absorbing system as a bubo, whether in the vessels, or the glands, when it originates from the absorption of venereal matter.

The matter is taken up by the absorbent vessels, and is conveyed by them into the circulation. In its passage through these vessels, it often affects them with the specific inflammation. The consequence is the formation of buboes, which are venereal abscesses. These are exactly similar to a chancre in their nature and effects, the only difference being in regard to size. As the lymphatic vessels and glands are irritated by the specific matter, before it has undergone any change in its passage, the inflammation produced, and the matter secreted, partake of the specific quality.

Inflammation of the absorbent vessels themselves is not nearly so frequent, as that of the glands. In men, such inflammations, in consequence of chancres upon the glans, or prepuce, generally appear like a cord, leading along the back of the penis from the sores. Sometimes, the absorbents inflame, in consequence of the thickening and excoriation of the prepuce in gonorrhœa. The indurated lymphatics often terminate insensibly near the root of the penis, or near the pubes; while, in other instances, they extend further to a lymphatic gland in the groin. Mr. Hunter believed, that this affection of the absorbent vessels is truly venereal. The formation of a hard cord, he conceived, arose from a thickening of the coats of the absorbents, and from an extravasation of coagulable lymph on their inner surface.

A cord, of the above kind, often suppurates, sometimes in more places than one, so as to form one, two, or three buboes, or small abscesses in the body of the penis.

Inflammation much more frequently affects the absorbent glands, than the vessels. The structure of the former parts appear to consist of the ramifications and reunion of the absorbent vessels. From this structure, observes Mr. Hunter, we may reasonably suppose, that the fluid absorbed is in some measure detained in the glands, and thus has a greater opportunity of communicating the disease to them, than to the distinct vessels.

Swellings of the absorbent glands may originate from other diseases, and should be carefully discriminated from those which arise from the venereal poison. With this view, Mr. Hunter advises us first to inquire into the cause, in order to ascertain whether there is any venereal complaint at some greater distance from the heart, such as chancres on the penis, or any preceding disease in this situation. He recommends us to inquire, whether any mercurial ointment has been at all applied to the leg and thigh on the diseased side; for mercury applied to those parts for the cure of a chancre, will sometimes cause glandular enlargements, which are occasionally mistaken for venereal buboes. This irritation of the inguinal glands by the mechanical action of mercurial ointment, has also been particularly noticed by Professor Assalini, who states, that he has had frequent opportunities of convincing himself of the fact. (See *Manuale di Chirurgia, p.* 67.) Mr. Hunter reminds us to observe, whether there has been any preceding disease in the constitution, such as a cold, fever, &c. The quick or slow progress of the swelling is likewise to be marked, and the tumour must be distinguished from femoral hernia, lumbar abscesses, and aneurisms of the crural artery. In particular cases, it would appear, that some time elapses; before the venereal matter produces its effects on the absorbent glands after its absorption. Mr. Hunter notices, that, sometimes, at least, six days transpire first; a circumstance, which can only be known by the chancres having healed six days before the bubo began to appear. However, as the last matter of a chancre is probably not venereal, he infers, that in cases of this kind, absorption must have taken place earlier than other considerations would lead one to suppose. According to Mr. Hunter, in general, only the glands nearest to the seat of absorption are attacked. Thus, when the matter is taken up from the penis in men, the inguinal glands are affected; and when from the vulva in women, those glands swell which are situated between the labium and thigh, and the round ligaments.

It was one of Mr. Hunter's opinions, that only one gland at a time is commonly affected by the absorption of venereal matter. If this sentiment be correct, the circumstance may be considered as a kind of criterion between venereal and other buboes. The second *order* of lymphatic vessels and glands are never affected; as, for instance, those along the iliac vessels, or back. Mr. Hunter informs us, that he also observed, that when the disease was contracted by a sore, or cut upon the finger, the bubo occurred a little above the bend of the arm, by the side of the biceps muscle, and no swelling of this sort formed in the arm-pit. However, he had heard of a few rare cases, in which a swelling in the axilla was also produced.

When buboes arise from a venereal disease on the penis, they are situated in the glands of the groin. When a bubo arises from a gonorrhœa, either groin may be attacked. But when the disease originates from a chancre, the bubo most frequently takes place in the nearest groin.

The situation of the absorbent glands, however, is not always exactly the same, and the course of the lymphatics therefore is subject to some variety. Hence, Mr. Hunter has seen a venereal bubo, produced by a chancre on the penis, situated a considerable way down the thigh; he has also often seen buboes as high as the lower part of the belly, before Poupart's ligament; and sometimes near the pubes. At the present day, swellings of the femoral glands are never considered venereal.

The seat of absorption is more extensive in the female sex, and the course of some of the absorbents is also different. Hence, buboes in women may occur in three situations, two of which are totally different from those in men.

When chancres are situated forwards, near the meatus urinarius, nymphæ, clitoris, labia, or mons veneris, the absorbed matter is generally conveyed along one, or both of the round ligaments, and the buboes are formed in those ligaments, just before they enter the abdomen. Mr. Hunter suspected such buboes not to be glandular ones, but only inflamed absorbents.

When chancres are situated far back, near or on the perinæum, the absorbed matter is carried forward along the angle, between the labium and the thigh, to the glands in the groin, and often, in this course, small buboes are formed in the absorbents similar to those *abscesses* which occur on the penis in men.

When the effects of the poison do not rest here, a bubo in the groin may be occasioned in the same manner as in men.

Owing to the difficulty of being sure, that women are quite free from infection, it is often more difficult to decide in them, than in men, whether a bubo is venereal, or not. In men, who have had no local complaint, the bubo can only be venereal, when direct absorption from the surface of the skin has taken place.

A bubo, says Mr. Hunter, commonly begins with a sense of pain, which leads the patient to examine the part, where a small hard tumour is to be felt. This increases, like every other inflammation, that has a tendency to suppuration, and unless checked, pus forms, and ulceration follows, the matter making its way to the skin very fast.

The above celebrated writer remarks, however, that there are some cases, which are slow in their progress. This circumstance he imputes either to the inflammatory process being kept back by mercury, or other means, or to its being retarded by a scrofulous tendency.

The inflammation, he says, is at first confined to the gland, which may be moved about in the cellular membrane; but when the part has become enlarged, or when the inflammation, and suppuration, are more advanced, the surrounding parts become more inflamed, and the tumour is more diffused. Some buboes become complicated with an erysipelatous and œdematous affection, by which they are rendered more diffused, and less disposed to suppurate.

Mr. Hunter allows, that to distinguish, with certainty, the true venereal bubo from other swellings of the glands in the groin, may be very difficult. He represents the true venereal bubo, in consequence of a chancre, as being most commonly confined to one gland. It preserves its specific distance till suppuration has taken place, and then becomes more diffused. It is rapid in its progress from inflammation to suppuration and ulceration. The suppuration is commonly large, considering the size of the gland, and there is only one abscess. The pain is very acute, and the inflamed part of the skin is of a florid red colour.

Mr. Hunter describes such buboes as arise without any visible cause, as being of two kinds. One sort inflame and suppurate briskly. These he always suspected to be venereal, although he allows there was no proof of it, and only a presumption deduced from the quick progress of the disease.

The second kind are generally preceded, and attended with slight fever, or the common symptoms of a cold, and they are generally indolent and slow in their progress. If they are quicker than ordinary, they become more diffused than venereal buboes, and they are often not confined to one gland. When very slow, they give but little sensation; but, when quicker, the sensation is more acute, though not so much so as in venereal cases. They usually do not suppurate, and often become stationary. When they do suppurate, it is in a slow manner, and frequently in more glands than one, while the inflammation is more diffused, and not considerable, in relation to the swelling. The matter makes its way to the skin slowly, and the part affected is of a more purple colour. Sometimes, the abscesses are very large, yet not painful.

In considering whether the swellings of the inguinal glands are, or are not venereal, the first thing to be attended to is, whether, or not, there are any venereal complaints. If there are none, Mr. Hunter observes, that there is a strong presumptive proof, that the swellings are not venereal. When the swelling is only in one gland, very slow in its progress, and gives but little, or no pain, it is probably merely scrofulous. However, when the swelling is considerable, diffused, and attended with some inflammation and pain, the constitution is most probably affected with slight fever, the symptoms of which are lassitude, loss of appetite, want of sleep, small quick pulse, and an appearance of approaching hectic. Such swellings are long in getting well, and do not seem to be affected by mercury, even when very early applied.

Mr. Hunter mentions his having seen the above affection of the groin, together with the constitutional indisposition, take place where there were chancres; and he was puzzled to determine, whether the disease in the groin was sympathetic, from derangement of the constitution, or whether it arose from the absorption of matter. He had long suspected, that there was a mixed case, and was at last certain, that such a case might prevail. He had seen instances, in which the venereal matter, like a cold, or fever, only irritated the glands to disease, producing in them scrofula, to which they were disposed.

In such cases, says Mr. Hunter, the swellings commonly arise slowly, give but little pain, and if mercury be given to destroy the venereal disposition, their progress is accelerated. Some suppurate while under this resolving course; and others, which probably had a venereal taint at first, become so indolent, that mercury has no effect upon them, and in the end, they either get well of themselves, or by other means.

According to Mr. Hunter, buboes are local complaints.

TREATMENT OF BUBOES.

When a bubo is judged to be venereal, and only in an inflamed state, an attempt is to be made to resolve the swelling. The propriety of the attempt, however, depends on the progress which the disease has made. If the bubo be very large, and suppuration appears to be near at hand, resolution is not likely to be effected. When suppuration has already taken place, Mr. Hunter much doubted the probability of any success attending the endeavour, which now may only retard the suppuration, and protract the cure.

The resolution of these inflammations, says Mr. Hunter, depends *principally on mercury, and almost absolutely on the quantity, which can be made to pass through them. When suppuration has taken place, the cure also depends on the same circumstances.* Hence, he recommended the mercury to be applied to such surfaces as allow the remedy, when absorbed, to pass through the diseased gland. In this manner, he conceived, that the disease in the groin might be subdued, and that the constitution would be less likely to be contaminated. At the same time, he admitted, that the situation of many buboes is such, as not to have much surface for absorption beyond them; for instance, the buboes on the body of the penis, arising from chancres on the glans, or prepuce.

As venereal buboes are an effect, or consequence of chancres, or venereal sores, and glandular swellings in the groin may take place from other kinds of sores, or local irritations, and even from various constitutional causes, while modern surgeons profess their incapacity always to pronounce the character either of a primary sore, or a bubo, by its first appearance, and progress, it is evident, that the same difficulties present themselves here, as in cases of primary sores, respecting the principles, by which the treatment should be guided. It is likewise to be remembered, that *buboes*, when supposed to be decidedly syphilitic, *are not*, as Mr. Hunter imagined, *absolutely incurable without mercury.* The firm confidence also, which Mr. Hunter had in the doctrine of the benefit derived from the practice of rubbing mercury into surfaces, from which it would be conveyed directly to the diseased glands, so as both to resolve the swelling and preserve the constitution, is not now regarded as an unquestionable subject. As Mr. Bacot has judiciously remarked, there is some inconsistence in Mr. Hunter's own statements upon this point; for, in one place he affirms, that mercury, applied to the legs and thighs for the cure of a chancre, will sometimes cause, instead of disperse, a bubo. (*P.* 404.) And Mr. Bacot believes himself, that mercury as frequently promotes the suppuration of buboes, as their dispersion. (*On Syphilis, p* 74.) And, respecting the practice of trying to make the mercury pass through the diseased glands, Mr. Hunter rather contradicts himself in another page, where he confesses his own doubts of its utility in suppurated buboes. However, Mr. Hunter admits, that mercury alone is not always capable of effecting the cure of such buboes as are deemed venereal; and when the inflammation rises very high, he approves of bleeding, purging, and fomentations. When the inflammation is erysipelatous, he has a high opinion of bark; and, when it is scrofulous, he praises hemlock, and poultices made with sea-water. He was also aware of the fact of emetics sometimes occasioning the absorption of the matter of buboes, after it is distinctly formed.

If there is generally great difficulty in pronouncing at first the nature of a primary sore, as to the question of its being syphilitic or not, the same difficulty must occur with respect to judging of the glandular swellings, excited by it. And, on this account, and from the encouraging circumstances, that all buboes may be cured without mercury, and that the course of the venereal disease, unresisted by that mineral, is not so terrible and incurable, as used to be supposed, some surgeons, instead of having immediate recourse to mercury, prefer a little delay, in order to see, whether the swelling will subside, or not, under the use of common antiphlogistic means. Thus, Dr. Hennen disapproves of using mercury immediately a bubo presents itself; and he states, that the same principles, which guide him in the primary ulcers, would have the same, if not greater force, in the case of buboes. "In their irritable state (says he) I consider mercury altogether inadmissible." (*On Military Surgery, Ed.* 2, *p.* 518.)

Although the correctness of some of the principles, by which Mr. Hunter regulated his practice in buboes, must now be questionable, inasmuch as he calculates too much on the absolute necessity for mercury, and on the usefulness of making it pass through the diseased glands, I conceive, that some of his directions are yet too important to excluded from this work. He says, quantity of mercury, necessary for the resolution of a bubo, must be proportioned to the obstinacy of the complaint; but that *care must be taken not to extend the employment of the medicine so far as to produce certain effects on the constitution.* When the bubo is in a situation, which admits of a large quantity of mercury being rubbed in, so as to pass through the swelling, and when the complaint readily yields to the use of half a drachm of mercurial ointment, every night, the mouth not becoming sore, or at most, only tender, Mr. Hunter thinks it sufficient to pursue this course, till the gland is reduced to its natural size. In this manner, the constitution will probably be safe, provided the chancre, which may have caused the bubo, heals at the same time. When the mouth is not affected in six, or eight days, and the gland does not readily resolve, then two scruples, or a drachm, may be applied every night; and, continues Mr. Hunter, if there should still be no amendment, even more must be rubbed in. In short (says he) if the reduction is obstinate, the mercury must be pushed as far as can be done *without a salivation.*

When there is a bubo on each side, so much mercury cannot be made to pass through each, as the constitution in general will not bear this method. However, Mr. Hunter sanctions the plan of minding the soreness of the mouth less in this kind of case; though, he adds, that *it is better to let the buboes proceed to suppuration, than to load the system with too much mercury.*

When the situation of buboes will not allow an adequate quantity of absorbed mercury to pass through them, the frictions must be continued in order to affect the constitution; but, according to Mr Hunter in this case, more mercury will be requisite, than when the remedy can be made to pass directly through the diseased gland; an assertion, which may now be doubted.

Many buboes remain, without either coming to resolution, or suppuration; and, notwithstanding every attempt to promote these changes, the glands become hard and scirrhous. Mr. Hunter conceived, that these cases are either scrofulous at first, or become so as soon as the venereal disposition is removed. He advises the use of hemlock, sea-water, poultices, and sea-bathing.

According to a modern surgeon, of judgment and considerable experience, when buboes are in a chronic stationary state, the application of blisters to the swelling is attended with the most beneficial effects. And, he rightly observes, that when such tumours are extremely hard and indolent, it is more advantageous to let the patient have the benefit of the open air, exercise, and his accustomed mode of living, than to confine him in an hospital. (*Assalini, in Manuale di Chirurgia, p.* 64; *Milano,* 1812.) Stimulating the skin with the antimonial ointment, is also sometimes a good practice.

The suppuration of buboes frequently cannot be prevented by any known means. They are then to be treated, in some respects, like any other abscess. Before opening buboes, Mr. Hunter conceived it advantageous to let the skin become as thin as possible, because a large opening would then be unnecessary, and no measures requisite for keeping the skin from closing, before the bottom of the sore had healed.

Mr. Hunter was doubtful, whether the application of mercury should be continued through the whole suppuration. He was inclined to continue it; but, in a smaller quantity.

There has been much dispute, whether a bubo should be opened, or allowed to burst of itself, and whether the opening should be made with a cutting instrument, or caustic. On this subject, Mr. Hunter remarks, that there is no peculiarity in a venereal abscess to make one practice more eligible than another. The surgeon, he says, should be guided in some degree, by the patient. Some patients are afraid of caustics; others, of cutting instruments. But, when the surgeon has the choice, Mr. Hunter expresses a preference to opening the bubo with a lancet, in which method, no skin is lost. But he observes, that when a bubo is very large, and there will be a great deal of loose skin, after the discharge of the matter, he thinks, that caustic may, perhaps, be better, as it will destroy some of the redundant skin, and occasion less inflammation, than what is caused by an incision. The potassa cum calce is the caustic commonly employed.

After the bubo has been opened, surgeons usually poultice it, as long as the discharge and inflammation are considerable, and then they employ dressings, which must be of a quality, adapted to circumstances. In the mean while, mercury is continued, both to make the bubo heal, and prevent the bad effects, which might otherwise arise from the matter being continually absorbed.

The mercurial course is to be pursued till the sore is no longer venereal. But, in general, since this point is difficult to ascertain, Mr. Hunter advises the continuance of mercury till the part has healed, and even somewhat longer, if the bubo has healed very quickly; for, the constitution is apt to become contaminated. However, he did not approve of this long use of mercury in all cases; because buboes often assume, besides the venereal, other dispositions, which mercury cannot cure, and will even exasperate.

Sometimes the sores, when they are losing, or entirely deprived of the venereal disposition, become changed into ulcers of another kind, and, most probably of various kinds. How far it is a disease arising from a venereal taint, and the effects of a mercurial course jointly, says Mr. Hunter, is not certain. He suspected, however, that the nature of the part, or constitution, had a principal share in the case, and, I believe, few surgeons of the present time entertain any doubt of the abuse of mercury being a very frequent cause, independently of any other circumstance. (See *Mathias on the Mercurial Disease, Ed.* 3.)

Mr. Hunter observes, that such diseases make the cure of the venereal affection much more uncertain, because, when the sore becomes stationary, or the mercury begins to disagree, we are ready to suspect that the virus is gone; but, this (he supposes) is not always the case. He had seen some buboes exceedingly painful and tender to almost every thing that touched them, and the more mild the dressings were, the more painful the parts became.

In some instances, the skin alone becomes diseased. The ulceration spreads to the surrounding integuments, while a new skin forms in the centre, and keeps pace with the ulceration, so that an irregular sore, which Mr. Hunter compares with a worm-eaten groove, is formed all round. It appears only to have the power of contaminating the parts, which have not yet been affected; and those which have, readily heal. According to the same author, when buboes become stationary, and are little inclined to spread, attended with a sinus, or two, hemlock, joined with bark, is the medicine most frequently serviceable. It is to be used both externally and internally. Mr. Hunter also speaks favourably of sarsaparilla, sea-bathing, and sea-water poultices. He states, that at the Lock Hospital, gold refiners' water has been found an useful application; and that in some cases, benefit has arisen from drinking large quantities of orange-juice, and from the use of mezereon.

Lues venerea. Surgeons imply, that a *lues venerea* has taken place, when the venereal virus has been absorbed into the circulation. Mr. Hunter does not think the epithet *constitutional* strictly proper in its application to this form of the venereal disease. By *constitutional* disease, he observes, he should understand that, in which every part of the body is acting in one way, as in fevers of all kinds; but, the venereal poison seems to be only diffused through the circulating fluids, and, as it were, to force certain parts of the body to assume the venereal action, which action is perfectly local. To use Mr. Hunter's phrase, it takes place in different parts in a regular succession of susceptibilities. Only a few parts are acting at the same time; and a person may be constitutionally affected in this way, and yet almost every function may be perfect.

The venereal poison is generally conveyed into the system from a chancre. It may, also, according to Mr. Hunter's doctrine, be absorbed from a gonorrhœa. There is likewise a possibility of its getting into the circulation from the surface of the body, without any previous ulceration. According to his doctrine, it may be absorbed from common ulcers, *without necessarily rendering them venereal;* and it may be taken up from wounds, in which cases, it generally first causes ulceration.

Venereal ulcers. In consequence of the blood being contaminated with real venereal pus, it might be expected that the local affects thus produced, would be similar in their nature to those producing them. Mr. Hunter believed, that this is not the case. He notices, that the local effects from a constitutional contamination, are all of one kind, viz. ulcers, let the effects make their appearance on any surface whatever, either the throat or common skin. But Mr. Hunter conceived, that if the matter, when in the constitution, were to act upon the same specific principles, as that which is externally applied, a gonorrhœa would arise, when it affected a canal, and only sores, or chancres, when it attacked other surfaces.

Mr. Hunter found, that even the sores which are caused in the throat are very different from chancres. He says, that the true chancre produces considerable inflammation, often attended with a great deal of pain, and quickly followed by suppuration. But the local effects, arising from the virus in the constitution, are slow in their progress, attended with little inflammation, and are seldom or never painful, except in particular parts. However, Mr. Hunter allows that this sluggishness in the effects of the poison depends on the nature of the parts diseased; and he owns that, when the tonsils, uvula, or nose, are affected, the progress of the morbid mischief is rapid, and bears a greater resemblance to a chancre than when it occurs on the skin. Even in those parts Mr. Hunter thought that the ulcers were attended with less inflammation than chancres which were spreading with equal celerity.

Before the time of Mr. Hunter, the matter, secreted by sores which arise from a constitutional infection, was always considered to be of a poisonous quality, like the matter of a chancre. At first, one would expect that this must actually be the case, because venereal matter is the cause, and mercury cures chancres, and also ulcers proceeding from a lues venerea. Mr. Hunter remarks, however, that the latter circumstance is not a decisive proof, since *mercury is capable of curing many diseases, besides the venereal.* He also takes notice, that when pus is absorbed from a chancre, it generally produces a bubo; but that a bubo is never occasioned by the absorption of matter from a venereal sore, arising from the virus diffused in the circulation. For instance, when there is a venereal ulcer in the throat, no buboes occur in the glands of the neck; when there are syphilitic sores on the arms, or even suppurating nodes on the ulna, no swellings form in the glands of the armpit, although these complaints occur when fresh venereal matter is applied to a common sore on the arm, hand, or fingers. No swelling is produced in the groin in consequence of nodes, or blotches on the legs and thighs.

Some very important experiments are related in Mr. Hunter's Treatise on the Venereal Disease, in order to prove that the matter from a gonorrhœa, or chancre, is capable of affecting a man locally, who is already labouring under a lues venerea, and that the matter from secondary syphilitic sores has not the same power. The particulars, however, are too long to be inserted in this book.

Parts most susceptible of the Lues Venerea, &c. Some parts of the body seem to be much less susceptible of the lues venerea than others; indeed, Mr. Hunter observes, that, as far as our knowledge extends, certain parts cannot be affected at all. The brain, heart, stomach, liver, kidneys, and several other viscera, have never been known to be attacked by syphilis.

The *first order of parts*, or those which become affected in the early stage of the lues venerea, are the skin, tonsils, nose, throat, inside of the mouth, and sometimes the tongue.

The *second order of parts*, or those which are affected at a later period, are the periosteum, fasciæ, and bones.

Mr. Hunter conceived, that one great reason of the superficial parts of the body suffering the effects of the lues venerea sooner than the deep-seated ones, depends on the former being more exposed to external cold. He remarked, that even the second order of parts do not all become diseased at the same time, nor every where at once. But, on the contrary, such as are nearest the external surface of the body are first diseased, as, for instance, the periosteum, bones of the head, the tibia, ulna, bones of the nose, &c. Neither does the disease affect these bones equally on all sides; but first on that side which is next to the external surface. It was Mr. Hunter's belief, however, that the susceptibility of particular bones did not altogether depend upon their nearness to the skin; but upon this circumstance and their hardness together.

The foregoing account by no means agrees with the results of modern inquiries into the nature of the venereal disease; for, unless mercury be given, it appears that the bones are very seldom affected by it. Thus in the cases which were treated by Mr. Rose without mercury, he observes, that "the constitutional symptoms were evidently not such as could be regarded as venereal, if we give credit to the commonly received ideas on the subject. Caries of the bones, and some of the least equivocal symptoms, did not occur. In no instance was there that uniform progress, with unrelenting fury, from one order of symptoms and parts affected to another, which is considered as an essential characteristic of true syphilis." (*Med. Chir. Trans. Vol.* 8, *p.* 423.) We learn also from Mr. Guthrie, that the bones were not affected in any of the cases, cured entirely without mercury in the York Hospital, though there were several other cases admitted, "in which a few mercurial pills had been taken, and the mouth not affected, and in which the primary symptoms were followed by eruptions both papular and scaly, by ulcers in the throat, *by nodes*, and, in one case, by inflammation of the periosteum covering the bones of the nose, and ulceration of the septum nasi, although mercury was resorted to for its cure." (*Vol. cit. p.* 560.)

In the examples treated without mercury, under the superintendence of Dr. Hennen, this gentleman did not see "a single case *in which the bones of the nose were affected*: some cases of periostitis, and of pains and swellings of the bones of the cranium and extremities were met with; but, except in two, he never remarked any nodes which could be regarded as *unequivocally syphilitic*." One of these yielded to blisters and sarsaparilla; the other, after resisting guaiacum and sudorifics, was dispersed by mercury. (*On Military Surgery, Ed.* 2, *p.* 581.) Dr. Hennen's statement on this subject would have been more satisfactory had it comprised his opinion of the characters of an unequivocally syphilitic node. On the whole, it appears tolerably certain that mercury, especially when employed unmercifully, and even when employed in moderation, and the patient exposes himself to damp and cold, tends to promote the frequency of nodes, as a sequel of the venereal disease, though as the long and abundant use of the same mineral does not cause the same consequence after other complaints, and venereal ulcers, treated altogether without mercury, rarely lead to nodes, it would seem as if these swellings were the product of the combined action of syphilis and mercury together. The infrequency of nodes in the strictly non-mercurial practice, is one of the most important facts yet established in its favour, and it is curious to find from some quotations made by Dr. Hennen, that it was well known in former days. Fallopius, in his 96th chap. De Ossium Corruptione, speaking of the loss of the bones of the nose and palate, says "et sciatis quod non in omni inveterato gallico hoc fit, sed *tantum in illis, in quibus inunctio facta est cum hydrargyro*." And Fernelius, in speaking of the injurious effects of mercury, observes, "recidiva raro similis est radici, neque iisdem symptomatis exercet, sed fere distillatione, arthritide tophis, vel ossium carie." (*Aphrodisiacus, Vol.* 3, *p.* 146.) And Palmarius, in considering the affection of the bones, as Dr. Hennen has noticed, uses the following remarkable words: "sed hoc iis duntaxat contingit, qui olim a lue venerea hydrargyrosi vindicati putarentur, non qui decocto guaiacino et alexipharmaco curati fuissent." (*De Morb. Contagiosis, Cap.* 7, *lib.* 2, *p.* 124; *Parisiis*, 1578.) Dr. Hennen expresses his own conviction, in which I entirely agree, that the carious affections of the bones, which are so common in persons treated by long mercurial courses, proceed not from the disease, but from the remedy rapidly and irregularly thrown in while periostitis exists; and he has not seen a single case of carious bone in the military hospitals, since the non-mercurial treatment was adopted, *except where mercury has formerly been used.* (*On Military Surgery, Ed.* 2, *p.* 505, 506.)

Nor will the results of modern experience and inquiries, made on a very extensive and impartial scale, allow us to consider the venereal disease as regularly and unavoidably leading to any secondary symptoms, even though no medicine at all be employed for their prevention. This is fully exemplified in the official reports of the army hospitals. The particulars of 5000 cases, spoken of by Sir James M'Grigor and Dr. Franklin, lead to the opinion, that "the frequency or rarity of secondary symptoms would seem to depend on circumstances not yet sufficiently understood or explained, although the following fact would tend to the belief, that either the constitutions of the men, or the mode of conducting the treatment without mercury, are the causes that possess the greatest influence in their production. In one regiment, 4 secondary cases out of 24, treated without mercury, supervened." In another regiment, 68 cases were treated without mercury, all bearing marks of true venereal disease, (and 28 of them especially selected for their decided characters of chancre) yet no secondary symptoms of any kind had taken place fifteen months after the treatment had ceased. The same document, founded on the above large number of cases, confirms another fact, that no peculiar secondary symptoms follow peculiar primary sores; a conclusion which is directly adverse to Mr. Carmichael's opinions, of which I have taken more notice in another work. (See *First Lines of the Practice of Surgery, Vol.* 1, *Ed.* 4.)

According to Mr. Hunter, the time necessary for the appearance or production of the local effects, in parts most susceptible of the disease, after the virus has passed into the constitution, is generally about six weeks; but in many cases the period is much longer, while in other instances it is shorter. Sometimes the local effects make their appearance within a fortnight after the possibility of absorption.

The effects on other parts of the body, which are less susceptible of the venereal irritation, or slower in their action, says Mr. Hunter, are much later in making their appearance. And when the first and second order of parts are both contaminated, the effects generally do not begin to appear in the latter till after a considerable time, and sometimes not till those affecting the former parts have been cured.

Mr. Hunter, however, refers to instances in which the periosteum, or bone, was affected before any of the first order of parts; but he was uncertain whether the skin or throat would afterward have become diseased, as the disorder was not allowed to go on.

Venereal Eruptions. The whole tenor of various facts, specified in the foregoing columns, tends to prove, that what is usually called the venereal disease is in reality several diseases, modified also by constitution, climate, regimen, and mode of treatment. And hence, perhaps, the chief source of all the perplexity and uncertainty, which are yet so manifest as fully to justify the doubt sometimes entertained, whether any disease, corresponding to the former notions of syphilis, really exists. Were any proof of the truth of this reflection needed, in addition to the many other proofs of it already premised, the subject of venereal eruptions would at once furnish it; for here no kind of regularity can be traced, either in the appearances on the skin abstractedly considered, nor in the connexion between certain kinds of primary ulcers and particular forms of cutaneous disease. Nay, as I have noticed in the preceding pages, sometimes, in consequence of a primary venereal sore, different kinds of eruptions form together, or successively on one individual; and, as far as one can judge by the eye, exactly the same kind of chancre may produce very different breakings out in different persons, even though treated on precisely the same plan. These circumstances are truly confusing. In Mr. Rose's paper, however, there is a partial confirmation of one part of Mr. Carmichael's theory, viz. the frequency of papular eruptions after simple primary ulcers, or superficial sores, which readily heal. According to the latter gentleman, this form of eruption may also follow gonorrhœa, and is generally preceded by fever, and ends in desquamation. Whatever may be the degree of truth respecting the relation between this kind of eruption and the alleged primary complaints, the practice recommended by Mr. Carmichael for such cases is judicious. General bloodletting is recommended when there is fever, and the medicines praised are antimonials and sarsaparilla Afterward, when the fever subsides, and the eruption desquamates, an alterative course of antimony and calomel, it is said, will accelerate the cure, though *not absolutely* necessary. In cases of venereal pustular eruptions, supposed by Mr. Carmichael to be most frequent after chancres with elevated edges, without induration, bloodletting is also advised during the febrile stage, followed by antimonials, sarsaparilla, guaiacum, tar-ointment, baths of sulphurated kali, or the nitro-muriatic bath; and after the pustules have terminated in scaly blotches, alterative doses of mercury, conjoined with sarsaparilla or guaiacum. An eruption of tubercles, or spots of a pustular tendency, or of both intermixed, preceded by fever, and terminating in ulcers covered with thick crusts, complaints which Mr. Carmichael considers a sequel rather of the phagedenic than other chancres, he treats at first by bloodletting, followed by antimonials, sarsaparilla, guaiacum, compound powder of ipecacuanha, arseniate of kali, nitrous acid, and nitro-muriatic bath. Mercury is said to be hurtful, except in the last stage. To scaly blotches, which he conceives to be a sequel of the true chancre, or callous ulcer, he applies the same local treatment as to pustular eruptions, and he deems the question, whether sarsaparilla and guaiacum might here be substituted for mercury, yet unsettled. (See *Obs. on the Symptoms, &c. of Venereal Diseases, Synopsis, p.* 205, *&c*) The investigations made in the military hospitals decidedly prove, that all kinds of eruptions, supposed to be venereal, may be cured without mercury; but, I believe, the great and superior usefulness of moderate quantities of mercury for the removal of the scaly, copper-coloured blotches, is still generally acknowledged. But, even in these cases of copper-coloured spots, Mr. Bacot's advice may be good, viz. when the general health is much deranged, the tongue loaded and furred, and the appetite gone, to defer mercury "until, by proper evacuations and attention to the general health," the patient has had the benefit of a delay, "which will, in many instances, render all farther medical treatment unnecessary. It is undoubtedly true that, whatever plan be pursued, these eruptive symptoms will eventually disappear; still, where they continue to linger for a long time, and are attended with their usual accompaniments of great languor, debility, and disturbed rest, I neither know, nor can I understand, the advantage of delaying that remedy, which repeated experience has taught me to rely upon," &c (*Bacot on Syphilis, p.* 99.) Although Mr. Carmichael's practice seems good, his theory, about the connexion of certain sores with particular eruptions, and other peculiar secondary symptoms, appears to be nearly refuted by the late investigations made in the military hospitals. To some facts, relating to this question, I have already adverted.

There is as little certainty, about the essential characters of a syphilitic eruption, as about the test of every other symptom of the venereal disease, or, rather diseases. While Mr. Hunter describes the eruption as generally occurring over the whole body, Dr. Bateman states, that syphilitic affections of the skin commonly make their first appearance on the face, where they are usually copious, and on the hands and wrists. (*Pract. Synopsis of Cutaneous Diseases, p.* 332, *edit.* 3) Their colour, he says, is in general less livid, than that of ordinary eruptions, being of a brownish red of different shades; but that this is not universal; for some of the syphilitic ecthymata have a bright red base in the beginning. Exposure to cold accelerates their progress, and increases their extent; while, on the other hand, warmth retards and meliorates them. (*P.* 333.) According to Hunter, the discolourations make the skin appear mottled, and many of the eruptions disappear, while others continue, and increase with the disease.

In other cases, the eruption comes on in distinct blotches, which are often not observed, till the scurf has begun to form. At other times, the eruption assumes the appearance of small distinct inflammations, containing matter, and resembling pimples, not being however, so pyramidal, nor so red at the base. Mr. Hunter also observes, that venereal blotches, on their first coming out, are often attended with inflammation, which gives them a degree of transparency, which is generally greater in the summer, than the winter, especially, if the patient be kept warm. In a little time, this inflammation disappears, and the cuticle peels off in the form of a scurf. The latter occurrence often misleads the patient and the surgeon, who look upon this dying away of the inflammation, as a decay of the disease, till a succession of scurfs undeceives them.

The parts affected next begin to form a copper-coloured, dry, inelastic cuticle, called a scurf, or scale. This is thrown off, and new ones are formed, which spread to the breadth of a sixpence or shilling; but, seldom more extensively, at least, for a considerable time. In the mean while, every succeeding scale becomes thicker and thicker, till at last it becomes a common scab. Then the disposition to the formation of matter takes place in the cutis underneath, and a true ulcer is produced, which commonly spreads, although in a slow way.

When the affected part of the skin is opposed by another portion of skin, which keeps it in some degree more moist, as between the nates, about the arms, between the scrotum and the thigh, in the angle between the two thighs, on the red part of the lip, or in the arm-pits, the eruptions, instead of being attended with scurfs and scabs, are accompanied with an elevation of the skin, which is swollen with extravasated lymph into a white, soft, moist, flat surface, which discharges a white matter. (*Hunter.*)

Mr. Carlisle has pointed out what he terms an herpetic abrasion of the cuticle on the breast, or abdomen, having the appearance of venereal blotches. He states, that it is less deep in the skin; that it has less of an inflammatory base; and that it is not so distinctly circumscribed, as the true venereal blotch. It never forms a purulent crust; but is simply a furfuraceous scaling of the cuticle. This form of disease seems to him to be produced by a disordered stomach and liver. (See *Lond. Med. Reposit. Vol.* 7, *p.* 92.)

A venereal eruption often attacks that part of the fingers, on which the nail is formed. Here, the disease renders that surface red, which is seen shining through the nail; and if allowed to continue, a separation of the nail takes place.

When surfaces of the body, covered with hair, are attacked, the hair separates, and cannot be re-produced as long as the disease lasts.

It must be allowed, that it is frequently very difficult to say, whether an eruption is syphilitic or not, and an opinion should rather be formed from the history of the case, than from any particular appearance of the eruption itself. As Dr. Bateman has remarked, the cutaneous eruptions, which are the result of the venereal poison, are often the source of considerable embarrassment to the practitioner. They assume such a variety of forms, that they bid defiance to any arrangement founded upon their external character; and in fact, they possess no common, or exclusive marks, by which their nature and origin are indicated. There is perhaps, no order of cutaneous appearances, and scarcely any genus, or species of the chronic eruptions, which these secondary symptoms of syphilis do not occasionally resemble. Dr. Bateman admits, however, that in many cases, there is a difference, which a practised eye will recognise, between the ordinary diseases of the skin and the syphilitic eruptions, to which the same generic appellation might be given. This, says he, is often observable *in the shade of colour, in the situation occupied by the eruption, in the mode of its distribution, and in the general complexion* of the patient. Hence, to a person conversant with those ordinary diseases, a degree of anomaly in these respects will immediately excite a suspicion, which will lead him to investigate the history of the progress of such an eruption, and of its concomitant symptoms. (See *Bateman's Practical Synopsis of Cutaneous Diseases, p.* 331, 332, *Edit.* 3.)

Dr. Hennen in his valuable book, does not pretend to be able to discriminate the true syphilitic eruptions from others, and indeed, by what criterion they are to be known, I am myself entirely puzzled to comprehend, after the numerous facts, so fully established by recent experimental inquiries. Dr. Hennen generally approves of delaying mercury at first, in order to see whether these cutaneous affections will yield to other means; "but (says he) I should not very long postpone the employment of the mildest mercurial alteratives, aided by warm bathing, and sudorifics. (*On Military Surgery, Ed.* 2, *p.* 518.)

Venereal Disease of the Throat, Mouth, and Tongue.—In the throat, tonsils, and inside of the mouth, the disease is said by Mr. Hunter generally to make its appearance at once in the form of an ulcer, without much previous tumefaction. Consequently the tonsils are not much enlarged.

A venereal ulcer in the throat was supposed by the same author to be in general tolerably well marked, though he confesses, that it may not in every instance be distinguishable from an ulcer of a different nature. Several diseases of the throat, he remarks, do not produce ulceration on the surface. One of these is common inflammation of the tonsils. The inflamed place often suppurates in the centre, so as to form an abscess, which bursts by a small opening; but never looks like an ulcer that has begun superficially, like a true venereal sore. The case is always attended with too much inflammation, pain, and tumefaction of the parts, to be venereal. Also when it suppurates and bursts, it subsides directly, and it is generally attended with other inflammatory symptoms in the constitution.

Mr. Hunter then notices an indolent tumefaction of the tonsils, peculiar to many persons whose constitutions are disposed to scrofula. The complaint produces a thickness in the speech. Sometimes coagulable lymph is thrown out on the surface of the parts affected, and occasions appearances, which are by some called ulcers; by some sloughs; and by others putrid sore-throats. The case is attended with too much swelling to be venereal, and with a little care, it may easily be distinguished from an ulcer, or loss of substance. However, when this difference is not obvious at first sight, it is proper to endeavour to remove some of the lymph, and if the surface of the tonsil underneath should appear to be free from ulceration, we may conclude with certainty, that the disease is not venereal. Mr. Hunter states, that he has seen a chink filled with coagulable lymph, so as to appear very much like an ulcer; but on removing that substance, the tonsil underneath was found perfectly sound. He adds, that he has seen cases of a swelled tonsil, having a slough in its centre, which slough before its detachment, looked very like a foul ulcer. The stage of the complaint, he says, is even more puzzling when the slough has come out; for then the disease has most of the characters of the venereal ulcer. Whenever he met with the disease in its first stage, he always treated it as if it had been of the nature of erysipelas, or a carbuncle. When the complaint is in its second stage, without any preceding local symptoms, he recommends the practitioner to suspend his judgment, and to wait a little, in order to see how far nature is able to relieve herself. If there should have been any preceding fever, the case is still less likely to be venereal. Mr. Hunter informs us, that he has seen a sore-throat of this kind mistaken for a venereal case, and mercury given till it affected the mouth, when the medicine brought on a mortification of all the parts concerned in the first disease.

Another complaint of these parts, which Mr. Hunter represents as being often taken for a venereal one, is an ulcerous excoriation, which runs along their surface, becoming very broad and sometimes foul, having a regular termination, but never going deeply into the substance of the parts, as Mr. Hunter believes the venereal ulcer does. No part of the inside of the mouth is exempt from this ulcerous excoriation; but, according to Mr. Hunter, the disease most frequently occurs about the root of the uvula, and spreads forward along the palatum molle. He remarks, that the complaint is evidently not venereal, *since it does not yield to mercury.* He has seen these ulcerous excoriations continue for weeks, without undergoing any change, and a true venereal ulcer make its appearance on the surface of the excoriated part. He says, that such excoriations were cured by bark, after the end of the mercurial course, by which the syphilitic sore was cured.

This author describes the true venereal ulcer in the throat, *as a fair loss of substance, part being dug out*, as it were, *from the body of the tonsil: it has a determinate* edge, and *is* commonly *very foul, having thick white matter, like a slough, adhering to it,* and not admitting of being washed away.

Here, however, as in most other supposed forms of syphilis, some test is wanting, by which the case may be certainly distinguished from other diseases of the throat, presenting similar appearances; for, as Mr. Rose has very truly remarked, "the excavated ulcer of the tonsils, as described by Mr. Hunter, is not, as Mr. Carmichael seems to think, a peculiar symptom of the presence of the syphilitic virus. I have repeatedly seen it, as well as the scaly blotch, in cases where mercury had been freely employed for the primary sores, and in which I considered the virus as eradicated, and both have disappeared under the use of sarsaparilla." (*Med. Chir. Trans. Vol.* 8, *p.* 421.) In a recent work, Mr. Carmichael himself acknowledges the justice of the preceding observation, and owns, that since the publication of his Essays, he has often noticed the excavated ulcer of the tonsils, either attending the primary phagedenic ulcer, or the train of constitutional symptoms which arise from it. (*On the Symptoms, &c. of Venereal Diseases, p.* 17.) In affections of the throat, Dr. Hennen states, that he "would be more guarded than in any others, in the employment of mercury, until all inflammatory disposition was removed." Afterward he has seen them yield, "as if by magic, so soon as the local effects of mercury on the parts within the mouth became obvious." But when mercury was given earlier, he has seen a vast number of instances in which irremediable mischief was done. (*On Military Surgery, Ed.* 2, *p.* 518.)

According to Hunter lues venerea sometimes produces a thickening and hardening of the tongue, but frequently ulceration, as in other parts of the mouth. He describes venereal sores on the tongue, as generally more painful than those on the skin; but less so than common sore throats from inflamed tonsils. They oblige the patient to speak thick, as if his tongue were too large for his mouth, with a small degree of snuffling.

Mr. Hunter doubted the reality of a venereal ophthalmy, though he owns that there are inflammations of the eyes, which yield to mercury. See the subject of iritis in the article *Ophthalmy*.

Symptoms of the second stage of Lues Venerea.—The periosteum, fasciæ, tendons, ligaments, and bones, are the parts which Mr. Hunter enumerates, as liable to be affected in the second stage of lues venerea. This observation in its full extent, however, seems to be rendered rather questionable; for it would appear from the evidence both of ancient and modern writers, that *true nodes*, or *venereal swellings of the bones, and particularly caries, rarely take place from syphilis, unless mercury be employed.* It is an observation of Mr. Hunter's, that we cannot always know with certainty what parts may become affected in this stage of the disease. He says he has known the distemper produce a total deafness, sometimes followed by suppuration, and great pain in the ear, and side of the head. I have already explained, that it was one of this gentleman's doctrines, that the second order of parts were generally deep-seated. When these become irritated by the poison, he observes that the progress of the disease is more gradual, than in the first order of parts. It assumes very much the character of scrofulous swellings, or chronic rheumatism; only it affects the joints less frequently than the latter affection does. A swelling sometimes makes its appearance on a bone, when there has been no possible means of catching the infection for many months; and in consequence of the little pain experienced, the tumour may be of some considerable size, before it is noticed. Sometimes a great deal of pain is felt; but no swelling comes on, till after a long while. According to Mr. Hunter, these remarks are also applicable to swellings of the tendons, and fasciæ. As tumours of this kind only increase by slow degrees, they are not attended with symptoms of much inflammation. When they attack the periosteum, they seem like an enlargement of the bone itself, in consequence of being very firm, and closely connected with the latter part. Mr. Hunter also further observes, that in these advanced stages of the disease, the inflammation can hardly get beyond the adhesive kind, in which state, it continues to become worse and worse, and when matter is formed, it is not true pus, but of a slimy description. Some nodes, he says, both of the tendons and bones, last for years, before they form any matter at all. *These cases*, he considered, *as not being certainly venereal*, though commonly considered as such. Mr. Hunter found it difficult to explain the reason why, when lues venerea attacks the bones, or the periosteum, the pain should sometimes be very considerable, and sometimes very trivial. Venereal pains in the bones are described by Mr. Hunter as being of a periodical kind, generally most severe in the night-time.

At the present day, when many cases formerly supposed to be syphilitic, are treated without any mercury, and even those which are reputed to be venereal, are cured by much smaller doses of that medicine than were given in Mr. Hunter's time, nodes have become much less frequent, and I have already in a previous part of this article expressed my decided belief in the justness of the opinion given by Fallopius and others, that a disposition to nodes is often occasioned by the abuse of mercury.

Treatment of Lues Venerea.—In Mr. Hunter's opinion, the first order of parts, or those which are most susceptible of being affected in lues venerea, are also the most easy of cure; while the second order of parts take more time to be remedied.

In the class of complaints, arising in the second stage of the lues venerea, Mr. Hunter believed, that it was unnecessary to continue the employment of mercury, till all the swelling had disappeared. For it is observed by this distinguished writer, that since these local complaints cannot contaminate the constitution by re-absorption, and since the venereal disposition and action from the constitution can be cured, while the local effects still remain, and this even when the tumefaction, forming nodes on the bones, fasciæ, &c. has proceeded to suppuration, there can be no occasion for continuing the course, after the venereal action has been destroyed. Whatever may be hereafter decided concerning the superiority of mercury as a remedy for many secondary symptoms, one thing appears already well made out, viz. that it should always be employed with moderation, lest it produce worse effects, and more terrible diseases, than those which it is designed to relieve. For an account of the various ways of exhibiting it, I must refer to the article *Mercury*.

To the following ingenious reasoning on the operation of mercury, and the principles by which its administration should be regulated, surgeons of the present day will not give more credit than facts warrant, because some of Mr. Hunter's opinions are manifestly influenced by the supposition, that mercury is *absolutely* necessary for the cure of the venereal disease.

In curing the lues venerea, mercury can only have two modes of action; one on the poison: the other on the constitution. If, says Mr. Hunter, mercury acted on the poison only one might conceive it did so, either by destroying its qualities, by decomposing it, or else by attracting it and carrying it out of the circulation. If mercury acted in the first of these ways, one would expect, that the cure would depend on the quantity of the medicine taken into the system. If it acted in the second manner, one would infer, that the progress of the cure would be proportionate to the quantity of evacuation. But, observes Mr. Hunter, if it act upon the principle of destroying the diseased action of the living parts, and of counteracting the venereal irritation, by producing one of a different kind, then, neither quantity alone, nor evacuations, will avail much. He states, that the quickness of the cure depends on quantity, joined with visible effects. However, it is added, that although the effects which mercury has upon the venereal disease, are in some degree proportioned to the local effects of the medicine on some of the glands, or particular parts of the body, as the mouth, skin, kidneys, and intestines, yet such effects are not altogether proportioned to these other circumstances. When mercury disagrees with the constitution, so as to produce great irritability and hectic symptoms, this action of irritation, as Mr. Hunter explains, is not a counter-irritation to the venereal disease.

It was also noticed by the same author, that the effects of mercury on lues venerea are always in proportion to the quantity of the remedy exhibited in a given time, and the susceptibility of the constitution to the mercurial irritation. He says that these circumstances require the most minute attention, and that, in order to obtain the greatest action of mercury with safety, and in the most effectual manner, the medicine must be given till it produces effects somewhere. However, it must not be exhibited too quickly, in order that a sufficient quantity may be given, before we are obliged to stop, in consequence of the effects. Mr. Hunter thinks, that when the local effects are produced too quickly, they prevent a sufficient quantity of the remedy from being taken into the system to counteract the venereal irritation at large.

Mr. Hunter mentions his having seen some cases, in which mercury acted very readily locally, and yet the constitution was hardly affected by it, for the disease would not give way. He states, that he has met with other cases, in which the mere quantity of mercury did not answer, till it was given so quickly as to affect the constitution in such a manner as to produce local irritation, and, consequently, sensible evacuations. This, he observes, is a proof that the local affects of mercury are often the sign of its specific effects on the constitution at large, and it shows that the susceptibility of the diseased parts to be affected by the medicine, is in proportion to its effects on the mouth. Its effects, he contends, are not to be imputed to evacuation; but to its irritation. Hence, he inculcates, that mercury should be given, if possible, in such a manner as to produce sensible effects upon some parts of the body, and in the largest quantity that can be given, to produce these effects within certain bounds. Mr. Hunter also remarks, that these sensible effects should be the means of determining how far the medicine may be pushed, so as to have the greatest effect on the disease, without endangering the constitution. The practice must vary according to circumstances; and if the disease is in a violent degree, less regard must be had to the constitution, and mercury must be thrown into the system in larger quantities; a very dangerous precept, as far as I can judge, from many cases in which I have seen it acted upon.

Mr. Hunter likewise acquaints us, that when the disease is in the first order of parts, a smaller quantity of mercury is necessary, than when the second order of parts are affected, and the disease has been of long standing, its first appearances alone being cured, and the venereal disposition still remaining in the secondary parts. For the purpose of curing the venereal disease, whether in the form of chancre, bubo, or lues venerea, Mr. Hunter was of opinion, that probably the same quantity of mercury is necessary. He represents, that one sore requires as much mercury as fifty sores in the same person, and a small sore as much as a large one. He thought that the only difference. if there is any, must depend upon the nature of the parts affected, that is, on their being naturally active or indolent. He conceived, however, that on the whole, recent venereal complaints are generally more difficult of cure, than the symptoms of lues venerea, and that this may make a difference, in regard to the quantity of mercury necessary.

Having now delivered the principal general instructions, relative to the exhibition of mercury in the treatment of the venereal disease, as given by Mr. Hunter, I must not quit this subject without remarking, that even this eminent surgeon appears on the whole too partial to the long use of mercury, and sometimes to the introduction of immoderate quantities of it into the system. In general, however, his observations tend to condemn all violent salivations. It is to be recollected, that in his days, nobody had a suspicion that truly syphilitic sores (if this expression be allowable, while they cannot be defined, nor distinguished by their appearances) would in the end spontaneously heal, and he himself had no dependence upon any medicine, except mercury, for the cure of the true venereal disease. But modern experience evinces, that the disorder seldom now presents itself in forms so bad and intractable as formerly; that it is even capable of spontaneously ceasing; and that we hardly ever see cases in which it is requisite to give mercury, except in very moderate quantities. Indeed, such is the change, that many surgeons suspect that the very nature of the disease must have undergone a material alteration or modification. In England, in my opinion, every thing is to be referred to the improved manner of employing mercury only in moderate doses, and never pushing its exhibition, till the constitution is so impaired, that undescribable forms of diseases ensue, which are sometimes the compound effect of mercury and syphilis together; and, in other instances of that description, which surgeons now frequently call *syphiloid*, or *pseudosyphilitic*, not depending upon the venereal poison at all, but upon a state of the system, which mercury is known to aggravate in the worst degree. For additional information concerning internal remedies for the venereal disease, see *Mercury, Guaiacum, Mezereon, Muriatic Acid, Nitrous Acid, Sarsaparilla, Sulphuric Acid, &c.*

With respect to the local treatment of the symptoms of lues venerea, Mr. Hunter thought that none would in general be necessary, since the constitutional treatment would commonly effect a cure. However, he admits, that sometimes the local effects will not give way, and the parts remain swollen in an indolent inactive state, even after there is every reason to believe that the constitution is perfectly cured. In such cases, he recommends assisting the constitutional treatment by local applications of mercury to the part, either in the form of a plaster or ointment. The latter application, he says, is the best. When these are not sufficient, he advises an attempt to be made to excite inflammation of another kind. He says *he has seen a venereal node, which gave excruciating pain, cured by merely making an incision down to the bone, the whole length of the node. The pain ceased, the swelling decreased, and the sore healed up kindly, without the assistance of a grain of mercury.* He mentions, that blisters have been applied to nodes with success, removing the pain, and taking away the swelling.

With regard to these last cases I may add, that, for many years past, the idea of completely dispersing nodes by mercury has been entirely abandoned in St. Bartholomew's hospital. In this institution, long protracted mercurial courses for the cure of such swellings are totally relinquished. When small moderate quantities of mercury have had their full effect, a blister is applied over the swelling, and kept open, under which plan the tumour generally subsides as far as its nature will allow.

Diseases resembling the Venereal. Pseudosyphilis.—Sores on the glans penis, prepuce, &c. in the form of chancres, as Mr. Hunter notices, may and do arise without any venereal infection, and sometimes they are a consequence of former venereal sores, which have been cured.

The symptoms, produced by the venereal poison in the constitution, are such as are common to many other diseases. For instance, Mr. Hunter remarks, that blotches on the skin are common to what is called a scorbutic habit; pains are common to rheumatism; swellings of the bones, periosteum, fasciæ, &c. to many bad habits, perhaps, of the scrofulous and rheumatic kind. Thus, says he, *most of the symptoms of the venereal disease, in all its forms, are to be found in many other diseases. Hence, the original cause, and many leading circumstances, such as dates, effects of the disorder upon others, from connexion, when only local, the previous and present symptoms, &c. must be considered, before we can determine absolutely what the disease truly is.* All the circumstances and symptoms, taken together, may be such as will attend no other disease. However, Mr. Hunter confesses, that with all our knowledge, and with all the application of that knowledge to suspicious symptoms of this disease, *we are often mistaken, calling distempers venereal, which are not so, and sometimes supposing really syphilitic affections to be of another nature.*

Mr. Hunter takes notice, that in some constitutions, rheumatism, in many of its symptoms, resembles the lues venerea. The nocturnal pains, swelling of the tendons, ligaments, and periosteum, and pain in those swellings, are symptoms both of the rheumatism, and also of the venereal disease, when it attacks such parts. Mr. Hunter, however, did not know that *he had ever seen the lues venerea attack the joints,* though many rheumatic complaints of such parts are cured by mercury, and therefore supposed to be venereal.

Mercury, given without caution, often produces the same symptoms as rheumatism. Such complaints Mr. Hunter had seen mistaken for venereal ones, and mercury continued. He explains, that some diseases not only resemble the venereal in appearance, but in the mode of contamination, proving themselves to be poisons by affecting the part of contact; then producing immediate consequences similar to buboes; and also remote consequences similar to the lues venerea.

Mr. Hunter observes, that it is nearly as dangerous, in some constitutions, to give mercury, when the disease is not venereal, as to omit it in other cases, which are really syphilitic; and had he been acquainted with recent investigations, he would undoubtedly have gone further, and declared that it is in reality far more dangerous. Many of the constitutions, which put on some of the venereal symptoms, when the disease is not really present, he says, are those with which mercury seldom agrees, and commonly does harm. He had seen mercury, which was exhibited for a supposed venereal ulcer of the tonsils, produce a mortification of those glands, and the patient was nearly destroyed.

Mr. Abernethy, in his *Surgical Observations*, 1804, has treated at some length of diseases resembling syphilis, and has adduced several very interesting cases, which I advise every surgical practitioner to read with the greatest attention, as in fact they confirm the views of the subject lately so fully established.

" A gentleman (says he) thought that he had infected a slight cut on his hand (which was situated in front of, and just below the little finger,) with the discharge from a bubo in the groin, that he had occasion to open. The wound fretted out into a sore about the size of a sixpence, which he showed me, and which I affirmed had not the thickened edge and base, and other characters of a venereal chancre. I therefore recommended him to try the effect of local means, and not to use mercury.

" In about a month the sore, which had spread a little, became again contracted in its dimensions, and assumed an healing appearance. At this time pain was felt extending up the arm, and suddenly a considerable tumour arose over the absorbing vessels, which proceed along the inner edge of the biceps muscle. This tumour became nearly as big as a small orange. As the original sore seemed now disposed to heal, and as there was no surrounding induration, I could not believe it venereal, and therefore recommended him still to abstain from mercury, and apply leeches and linen moistened in the aq. litharg. acet. comp. to the tumour formed over the inflamed absorbents. For it seemed to me, that if the venereal poison had been imbibed from the sore, it would have passed on to one of the axillary glands, and would have caused induration and inflammation to take place there more slowly than had occurred on the present occasion.

" Under this treatment the tumour was discussed, and the sore at the same time healed. About three weeks afterward, the patient called on me, and said that there were venereal ulcers in his throat; and in each tonsil there was an ulcer deeply excavated, with irregular edges, and with a surface covered by adhering matter; ulcers, in short, which every surgeon, who depends on his sight as his guide, would have pronounced to be venereal. Shortly after also some copper-coloured eruptions appeared on his face and breast. He showed his diseases to several surgeons, on whose opinion he relied, who, without hesitation, affirmed that they were venereal, and that the mercurial course had been improperly delayed.

" While the patient was looking out for lodgings, in order that he might go through the mercurial process, a circumscribed thickening and elevation of the pericranium, covering the frontal bone, appeared: it was of the circumference of a half-crown piece; and was, in short, what every surgeon, who is guided only by his sight and touch, would, without hesitation, have called a fair corona veneris. I now told the patient that I was more inclined to believe his disease was not syphilitic, from the sudden and simultaneous occurrence of this node, with the sore throat, &c. Other surgeons thought differently; and I believe this very sensible and amiable young man imagined that his health would become a sacrifice, if he any longer attended to my opinion. He was preparing to submit to a mercurial course, when very important concerns called him instantly into the country. He went with great reluctance, taking with him mercurial ointment, &c.; and after a fortnight, I received a letter from him, saying that he found his complaints benefited by his journey, that business had prevented him from beginning the use of mercury for a few days; that he now found it was unnecessary, for his symptoms had almost disappeared; and shortly afterward he became perfectly well."

Mr. Abernethy considers this case as the most unequivocal instance extant of a disease occurring, which could not from appearance be distinguished by surgeons of the greatest experience from syphilis, and which, however, was undoubtedly of a different nature; (that is to say, it was of a different nature, according to certain criteria, then generally believed, but which recent investigations have proved to be destitute of foundation.) All the tests here alluded to having been spoken of in the foregoing columns, I shall not here repeat them.

Some years ago the nitric acid was introduced as a remedy for syphilis. (See *Nitrous Acid.*) To the position of its efficacy being as great in venereal cases as was first alleged, many surgeons have not acceded, though, as a sensible writer has observed, it has certainly been allowed, with some other medicines, to remain in a kind of copartnership with mercury, and admitted to be useful in venereal cases under certain circumstances. A great deal of this want of agreement, on the effects of remedies in syphilitic cases, is now explained by the imperfection of the diagnosis, and the important fact, that the disease may generally be cured in time, without any medicines whatsoever, though this time is sometimes long. Dr. Scott, who first suggested the use of nitrous acid, has attempted to account for its alleged occasional failures, by observing that the acid, which he employed, was not pure nitric acid, but an impure acid, containing an admixture of muriatic acid. He therefore, some time ago, recommended the use of a compound acid, containing three parts of nitric acid, and one of muriatic, which he administered internally, and also applied externally, largely diluted, as a bath, until the gums were affected and ptyalism produced; and he conceived every trial as quite inconclusive, unless these constitutional effects occurred.

"The acid that I have used of late (says Dr. Scott) is the nitro muriatic; and it is formed by mixing together equal parts of the nitrous, or nitric acid, and muriatic acid. If these acids be in the state of concentration, that they usually possess in the shops, and if the quantities be considerable, a great volume of gas is evolved on their coming into contact, which taints every part of a house, is extremely hurtful to the lungs, and disagreeable to the smell. To avoid this inconvenience, I put a quantity of water, at least equal in bulk to both the acids, into a bottle, and I add the acids to it separately. This method does not only prevent the unpleasant odour, but it tends to retain the chlorine, on which its effects depend. It is well known, that the nitro-muriatic acid acts very readily on the metals and earth; nothing therefore but glass, or extremely well glazed vessels of porcelain, should be used to contain it. Wooden tubs for bathing answer very well, and they should always be made *as small as possible*, compatible with their holding the body, or the limbs that we wish to expose to the bath. From their being small, we save acid, and are able to heat the bath with ease. In India, I have often exposed the whole body below the head to this bath; but here I have been satisfied, in general, with keeping the legs and feet exposed to it. In order to warm the bath, after the first time, I have commonly made a third or a fourth part of it to be thrown away, and the loss replaced by boiling water and a proportional quantity of acid. To save the expenditure of acid, I have occasionally warmed a portion of the bath in porcelain vessels, placed near the fire, but I fear this may diminish its effects.

"It is no easy matter (continues Dr. Scott,) to give directions, with regard to the degree of acidity of the bath. I have commonly made it about as strong as very weak vinegar, trusting to the taste alone. The strength should be regulated by the degree of irritability of the patient's skin. I may say, that although I like to know that it is strong enough to prick the skin a very little, after being exposed to it from fifteen to thirty minutes, yet I believe that even such an effect as this is unnecessary.

"The time too of remaining in the bath, in order to produce the greatest effect, is a matter of doubt. I have kept the legs and feet exposed to it for half an hour or more; but, with more delicate people, not above one-half, or one-third of that time. I have repeated these baths daily, or even twice, or thrice a day. (See *Med. Chir. Trans. Vol.* 8, *p.* 181.) Dr. Scott adds, that the mere sponging the skin with nitro-muriatic acid, sufficiently diluted with water, gives rise to the very same effects as bathing, and is more easily adopted. Fifteen or twenty minutes may be employed in the sponging, though a much less time produces very material effects.

Dr. Scott has found the nitro-muriatic acid particularly useful, even in this country, in that description of syphilis, which is termed *pseudo-syphilis;* and he attributes the beneficial effects to the chlorine, which is loosely combined in this compound. (See *Journal of Science and the Arts, Vol.* 1, *p.* 205—211. *Lond. Med. Reposit. Vol.* 7, *p.* 59; *and Med. and Chir. Trans. Vol.* 8, *p.* 173, *et seq.*)

The only important conclusion which I venture to draw from Dr. Scott's observations, is a confirmation of the fact of the generally curable nature of syphilitic diseases, without the aid of mercury. And I further believe, that though the nitro-muriatic bath may sometimes be useful, the surest way of bringing it into discredit is to represent it as applicable to all forms of syphilis, for which neither this remedy, nor even mercury itself, will ever suffice.

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VENESECTION. (from *vena*, a vein, and *sectio*, a division.) The operation of opening a vein. Phlebotomy. See *Bleeding.*

VERRU'CA. A Wart. See *Wart.*

VERTEBRÆ, DISEASE OF. The case, here to be considered, is a disease of the spine, sometimes originating in an ulceration of the intervertebral cartilages, sometimes in a morbid condition of the cancellous structure of the bodies of the vertebræ (*Brodie on Diseases of the Joints, p.* 259,) followed by a more or less complete loss of the power of using the legs.

Formerly, the affection of the limbs was generally called a palsy, and treated as a paralytic affection; to which it is in almost every respect perfectly unlike.

In the true paralysis, (says Mr. Pott) from whatever cause, the muscles of the affected limb are soft, flabby, unresisting, and incapable of being put into even a tonic state; the limb itself may be placed in almost any position, or posture; if it be lifted up, and then let go, it falls down, and it is not in the power of the patient to prevent, or even to retard, its fall; the joints are perfectly and easily moveable in any direction; if the affection be of the lower limbs, neither hips, knees, nor ankles, have any degree of rigidity, or stiffness; but permit the limb to be turned, or twisted, in almost any manner.

In the present case, the muscles are indeed lessened, but they are rigid, and always at least in a tonic state, by which the knees and ankles acquire a stiffness not very easy to overcome. By means of this stiffness, mixed with a kind of spasm, the legs of the patient are either constantly kept stretched out straight, in which case considerable force is required to bend the knees, or they are, by the action of the stronger muscles, drawn across each other, in such manner as to require as much to separate them. When the leg is in a straight position, the extensor muscles act so powerfully, as to require a considerable degree of force to bend the joints of the knees; and, when they have been bent, the legs are immediately, and strongly, drawn up with the heels toward the buttocks. By the rigidity of the ankle joints, joined to the spasmodic action of the gastrocnemii muscles, the patient's toes are pointed downward, in such manner as to render it impossible for him to put his foot flat to the ground: which makes one of the decisive characteristics of the distemper.

The majority of those who labour under this disease, are infants, or young children: adults are by no means exempt from it; but Mr. Pott never saw it at an age beyond forty; and Mr. Baynton never met with more than three instances, which approached that period of life. (*On Diseases of the Spine, p.* 4.)

In one case, however, recited by Mr. Brodie, the patient was forty-five years old. (*On Diseases of Joints, p.* 268.) By Pott, Baynton, and several other writers, a belief is entertained, that the disease is most disposed to happen in scrofulous subjects, in which opinion I am also disposed to join. There can also be no doubt of the fact, stated by Mr. Pott, that it most frequently happens in weak and delicate children.

According to Mr. Pott, if the patient be a child, the account, most frequently given is, that for some time previous to the incapacity of using its limbs, it had been observed to be languid, listless, and very soon tired; that it was unwilling to move much, or briskly; that it had been observed frequenly to trip and stumble, although no impediment lay in its way; that when it moved hastily, or unguardedly, its legs would cross each other involuntarily by which it was often and suddenly thrown down; that if it endeavoured to stand still, and upright, unsupported by another person, its knees would totter and bend under it; that it could not, with any degree of precision or certainty, steadily direct either of its feet to any particular point, but, that in attempting so to do, they would be suddenly, and involuntarily, brought across each other; that soon after this, it complained of frequent pains and twitchings in its thighs, particularly when in bed, and of an uneasy sensation at the pit of the stomach; that when it sat on a chair, or a stool, its legs were almost always found across each other, and drawn up under the seat; and that in a little time after these particulars had been observed, it totally lost the power of walking.

The same author observes, that if the incurvation be of the neck, and to a considerable degree, by affecting several vertebræ, the child finds it inconvenient and painful to support its own head, and is always desirous of laying it on a table or pillow, or any thing to take off the weight. If the affection be of the dorsal vertebræ, it is soon attended with loss of appetite, hard dry cough, laborious respiration, quick pulse, and disposition to hectic.

Mr. Pott states, that an adult, in a case where no violence has been committed or received, will tell you that his first intimation was a sense of weakness in his backbone, accompanied with what he will call a heavy dull kind of pain, attended with such a lassitude as rendered a small degree of exercise fatiguing; that this was soon followed by an unusual sense of coldness in his thighs, not accountable for from the weather, and a palpable diminution of their sensibility. That, in a little time more, his limbs were frequently convulsed by involuntary twitchings, particularly troublesome in the night; that soon after this, he not only became incapable of walking, but that his power either of retaining or discharging his urine and feces was considerably impaired, and his penis became incapable of erection. The adult also finds all the offices of his digestive and respiratory organs much affected, and complains constantly of pain and tightness at his stomach.

The true cause of the disease is a morbid state of the spine, and of some of the parts connected with it; *which distempered state of parts will, upon careful inquiry, be always found to have preceded the deformity some length of time;* in infants, this is the sole cause, and external violence has nothing to do with it. "In the adult (says Mr. Pott) I will not assert, that external mischief is always and totally out of the question; but I will venture to affirm, what is equal, as far as regards the true nature of the case, which is, that although accident and violence may, in some few instances, be allowed to have contributed to its more immediate appearance, yet the part in which it shows itself, must have been previously in a morbid state, and thereby predisposed for the production of it. I do not by this mean to say, that a violent exertion cannot injure the spine, nor produce a paralytic complaint: that would be to say more than I know; but I will venture to assert, that no degree of violence whatever is capable of producing such an appearance as I am now speaking of, unless the bodies of the vertebræ were by previous distemper disposed to give way; and that no supposable dislocation, caused by mere violence done to the bones of the back, which bones were, before the receipt of the injury, in a sound state, can possibly be attended with the peculiar symptoms of a curved spine."

For some observations, connected with this point, I refer the reader to C. Bell's Surgical Observations, Vol. 1.

Mr. Brodie agrees with Mr. Pott, and other writers on the fact, that the actual curvature must be preceded by a disease of the parts, unaccompanied with any visible deformity, and "cannot take place until the caries has made considerable progress." In the early stage of the case, therefore, when, as Mr. Brodie justly observes, the diagnosis is of the most importance, no information can be obtained from the appearance of the spine itself, the shape of which is yet unchanged; and frequently the symptoms, which do take place early, are not unequivocal; they are, according to this writer, "a pain, and some degree of tenderness in that part of the spine where the disease has begun; a sense of constriction of the chest; an uneasy feeling at the pit of the stomach, and of the whole abdomen; a disturbed state of the functions of the alimentary canal, and of the urinary bladder; a sense of weakness and aching, and occasional cramps of the muscles of the extremities." But, as Mr. Brodie confesses, very similar symptoms may arise from other causes, and sometimes no particular complaints are made previously to the actual discovery of the curvature. (*On Diseases of Joints, p.* 279, 280.)

I have already mentioned Mr. Brodie's opinion, deduced from dissection, that, in many instances, caries of the spine has its origin in an ulceration of the intervertebral cartilages, beginning in their centre, and extending to their circumference, and afterward affecting the bodies of the contiguous vertebræ; but that, in other cases, the disease has its origin in the bodies of the vertebræ themselves, which are liable to the same peculiar disease of the cancellous structure, which is noticed in the articulating extremities of other bones. (*Brodie on Diseases of Joints, p.* 267.) This gentleman suspects that the disease, which begins in the cancellous structure of the vertebræ, is more immediately followed by suppuration, than that which commences in the intervertebral cartilages; and that the first form of the disease seldom occasions so extensive a destruction of the vertebræ, as the last. "But (says Mr. Brodie) farther than this, nothing which I have hitherto observed, enables me to point out any circumstances, in which the symptoms of these different diseases differ." (*P.* 276.) Respecting another statement, that when the lumbar vertebræ are alone affected, the symptoms dependent on pressure, or irritation, of the spinal marrow, are absent, I cannot say that it accords with several cases which have fallen under my own notice, that is to say, if the affection of the lower limbs is to be received as a test of such irritation or pressure.

According to Mr. Pott, the true curvature is invariably uniform, in being from within outward; but it varies in situation, in extent, and in degrees; it affects the neck, the back, or the loins; it comprehends one vertebra only, or two, or more; and as few or more are affected, or as these are more or less morbid, and consequently give way more or less, the curve must be different.

In these cases, as Mr. Brodie remarks, "the distortion of the spine is usually of a peculiar kind, and such as nothing can produce, except the destruction of the bodies of one or more vertebræ. The spine is bent forward, so as to form an angle posteriorly; and although the destruction of the vertebræ may be the same, it is more obvious in some parts of the spine than it is in others. For example, the spinous processes in the middle of the back being long, and projecting downwards, the elevation of one of these must occasion a greater prominence than that of one of the spinous processes of the neck, which are short, and stand directly backwards.

"Curvature of the spine, in the direction forwards, may arise from other causes, as a weak condition of the muscles, or a rickety affection of the bones. In general, in such cases, the curvature occupies the whole spine, which assumes the form of a segment of a circle. At other times, however, it occupies only a portion of the spine, usually that which is formed by the superior lumbar and inferior dorsal vertebræ." But here, as Mr. Brodie has found, the curvature is always gradual, and never angular; a circumstance by which it is distinguishable from the curvature produced by caries. The cases, however, he thinks, have often been confounded, and some speedy and complete cures of carious spine on record, he infers, must have been cases of an entirely different nature. (*On Diseases of Joints, p.* 282, *&c.* and *Earle, in Edinb. Med. Journ. Jan.* 1815.)

Lateral curvatures of the spine are alleged generally to incline to the right side; and the fact is referred (with what correctness I know not,) to the undue power, which is acquired by the more general use of the right arm, and of other muscles, in the performance of the voluntary actions." (*Baynton on Diseases of the Spine, p.* 43.) It is admitted, however, that exceptions are met with, and that the lateral curvature sometimes tends to the left, and occasionally resembles the letter S reversed. On this subject, I have also another rare exception to specify, which is explained by Mr. Brodie, viz. that though lateral distortions of the spine generally arise from causes independent of caries, a slight degree of lateral curvature is, in some instances, produced by the bodies of the vertebræ having been destroyed on one side by caries in a greater degree than on the other. (*Brodie on Joints, p.* 284.)

In general, the lower limbs alone usually feel the effect. Mr. Pott, however, had seen two cases, in one of which the arms only were affected; in the other, both legs and arms. Mr. Ford showed him a lad, who had lost the use of both arms and legs from a curvature. An account of two similar examples was also communicated to Mr. Pott by Mr. Parke, of Liverpool.

Mr. Brodie has never known the paralysis affect the muscles of the arms, when the disease was at the lower or middle part of the spine; but he agrees with Mr. Copeland, that the symptoms are not always confined to parts below the disease, and that it is not uncommon for pains in the upper extremities to accompany the paralytic affection of the legs and thighs. (*Brodie, p.* 285. *Copeland, Obs. on Diseased Spine, &c.*)

Very soon after the curvature, some patients are rendered totally and absolutely incapable not only of walking, but of using their legs in any manner; others can make shift to move about with the help of crutches, or by grasping their thighs just above the knees with both hands; some can sit in an armed chair, without much trouble or fatigue; others cannot sit up with any help; some retain such a degree of power of using their legs as to be able to shift their posture when in bed; others have no such power, and are obliged to be moved upon all occasions.

I have been present at the dissection of persons who died of lumbar abscesses, and who, while they lived, never suffered the peculiar loss of the use of the lower extremities, so well described by Mr. Pott, though the vertebræ were found to be diseased. However, in other instances of such abscesses, attended with caries of the spine, the legs are deprived of their power. But, whether the difference is to be explained by the consideration, that, in some cases, the disease of the bone may be secondary and the abscess itself the primary complaint, I cannot determine. At all events, suppuration is frequently only an effect, the curvature existing long before the abscess; and, in such cases, the legs are effected. A few weeks ago, Mr. Dunn, of Scarborough, consulted me about a case in which the latter facts were exemplified. Mr. Brodie's opinion, that suppuration takes place at an earlier period in cases where the disease begins in the cancellous structure of the bones, has been already noticed. In having a tendency to excite suppuration, and in producing the weakness of the lower extremities, the present disease of the spine appears to be materially different from the absorption of the vertebræ, sometimes caused by the pressure of aneurisms, and other tumours. (*Hodgson on Diseases of Arteries, &c. p.* 80.)

Mr. Pott observes:—When a child appears to be what the common people call naturally weakly, whatever complaints it may have are supposed to be caused by its weak state, and it is generally believed, that time and common care will remove them; but when a curvature has made its appearance, all these marks of ill health, such as laborious respiration, hard cough, quick pulse, hectical heat and flushing, pain and tightness of the stomach, &c. are more attentively regarded, and set to the account of the deformity consequent to the curve, more especially if the curvature be of the dorsal vertebræ, in which case the deformity is always greatest; but whoever will carefully attend to all the circumstances of this disorder, will be convinced, that most, if not all the complaints of children, labouring under this infirmity, precede the curvature, and that a morbid state of the spine, and of the parts connected with it, is the original and primary cause of both.

Among many other reasons for thinking, that an effect was mistaken for a cause, Mr. Pott enumerates the following:

1. "That he did not remember ever to

have seen this useless state of the limbs from a mere malformation of the spine, however crooked such malformation might have made it.

2. "That none of those deviations from right shape, which growing girls are so liable to, however great the deformity might be, was ever attended with this effect."

With respect to the treatment of diseased spine, I think one principle laid down by Mr. Pott, must receive approbation; viz. that the primary and sole cause of all the symptoms is a distempered state of the parts, composing, or in immediate connexion with the spine, tending to, and most frequently ending in a caries of the vertebræ. Hence, says he, all the ills, whether general or local, apparent or concealed; the ill health of the patient, and in time the curvature. As the disease does not originate in the limbs, no application to them can be of any use, and the great indication must be to stop the progress of the disease in the affected part of the spine.

The first suggestion of the probability that issues might prove serviceable in this disease, appears to have been made to Mr. Pott by Dr. Cameron, of Worcester, who told him, that having remarked in Hippocrates, an account of paralysis of the lower limbs, cured by an abscess in the back, he had in a case of useless limbs, attended with a curvature of the spine, endeavoured to imitate this act of nature, by exciting a purulent discharge, and that it had proved very beneficial: which was confirmed to Mr. Pott by Mr. Jeffreys, of Worcester, who had made the experiment with the same success.

The practice which Pott recommends, consists merely in procuring a large discharge of matter from the integuments on each side of the distempered bones forming the curvature, and in maintaining such discharge until the patient shall have recovered his health and the use of his limbs. They who are little conversant with matters of this sort (says Mr. Pott) will suppose the means very inadequate to the proposed end; but they who have been experimentally acquainted with the very wonderful effects of purulent drains, made from the immediate neighbourhood of diseases, will not be so much surprised at this particular one; and will immediately see how such kind of discharge, made and continued from the distempered part, checks the further progress of the caries, gives nature an opportunity of exerting her own powers of throwing off the diseased parts, and of producing, by incarnation, an union of the bones (now rendered sound,) and thereby establishing a cure.

Mr. Pott considers it a matter of very little importance towards the cure, by what means the discharge be procured, provided it be large, that it come from a sufficient depth, and that it be continued for a sufficient length of time. He tried setons, issues by incision, and issues by caustic, and found the last in general preferable, being least painful, most cleanly, most easily manageable, and capable of being longest continued.

The caustics, he observes, should be applied on each side of the curvature in such a manner as to leave the portion of skin, covering the spinal processes of the protruding bones entire and unhurt, and so large, that the sores upon the separation of the eschars, may easily hold each three or four peas, in the case of the smallest curvature; but in large curves, at least as many more.

The issues which modern surgeons usually make, for the relief of the symptoms arising from diseased vertebræ, are larger than such as Mr. Pott himself was in the habit of forming. They now commonly prefer making an issue on each side of the spinous processes, about three or four inches long, and half an inch broad.

The size of the issue intended to be made being determined, the place where it is to be made should be accurately marked out with ink. All the skin immediately around should then be covered with adhesive plaster, in order that it may be protected from the action of the caustic. Let the surgeon next take a piece of caustic potassa, or of potassa cum calce, and wrap a little tow round one end of it, so that he may take hold of it with safety and convenience. The other end of the caustic should then be moistened a little, and rubbed very quickly on the portion of the integuments, which is to be converted into an eschar. The caustic is to be rubbed in this manner, till the part turns of a dull brown colour, when the caustic should be carefully washed off with a little wet tow, and a poultice applied.

As soon as the eschars admit of being removed, a row of peas, or beans, connected together with thread, should be laid on the sore, and confined there with sticking plaster. A compress, containing a piece of pasteboard, or sheet-lead, is then to be bound over the peas or beans with a roller. In consequence of the continued pressure, the peas or beans soon form little hollows for themselves, in which they should be regularly placed every day. When the pressure is not duly maintained, the granulations are apt to rise so high, that the peas cannot be well kept on the part. In this circumstance, the surgeon must try to repress the high surface of the sore, by sprinkling on it a little savine powder and subacetate of copper, mixed together in equal proportions. When this plan is unavailing, the reapplication of the caustic becomes indispensable.

Whatever time may be requisite to restore the health, as well as the use of the limbs, Mr. Pott thinks, that the issues should be kept open until these objects are completely fulfilled; and even longer, especially in growing children. He owns that nothing can be more uncertain, than the time required for the cure. He has seen it perfected in two or three months; and he has known it require two years; two-thirds of which time passed before there was any visible amendment.

After the discharge has been made some time, the patient is found to be better, in all general respects, and if of age to distinguish, will acknowledge, that he feels himself to be better in health; he begins to recover his appetite, gets refreshing sleep, and has a more quiet and less hectical pulse; but the relief which he feels above all others, is from having got rid of that distressing sensation of tightness about the stomach; in a little time more a degree of warmth, and a sensibility are felt in the thighs, which they had been strangers to for some time; and generally much about the same time the power of retaining and discharging the urine and feces begins to be in some degree exerted.

The first return of the power of motion in the limbs, says Mr. Pott, is rather disagreeable; the motions being involuntary, and of the spasmodic kind, principally in the night; and generally attended with a sense of pain in all the muscles concerned.

At this point of amendment, if it may be so called, it is no uncommon thing, especially in bad cases, for the patient to stand some time without making any farther progress; this, in adults, occasions impatience, and in parents, despair; but in the milder kind of case, the power of voluntary motion generally soon follows the involuntary.

The knees and ankles, by degrees, lose their stiffness, and the relaxation of the latter enables the patient to set his feet flat upon the ground, the certain mark that the power of walking will soon follow; but those joints having lost their rigidity, become exceedingly weak, and are not for some time capable of serving the purpose of progression.

An attentive examination of the morbid appearances, and their effects in different subjects, led Mr. Pott to conclude, among other things, that the disease which produces these effects on the spine, and the parts in its vicinity, is what is in general called scrofula.

That ulceration or caries of the bodies of the vertebræ affected, is the common morbid change, and not enlargement.

That when the attack is made upon the dorsal vertebræ, the sternum and ribs, for want of proper support, necessarily give way, and deformity, additional to the curve, is produced.

That this kind of caries is always confined to the bodies of the vertebæ, seldom or never affecting the articular processes. Two cases were seen by Pott, in which the bodies of the vertebræ were completely detached from their processes, so as to leave the membrane of the spinal marrow perfectly bare.

That without this destruction of the bodies of the vertebræ, there can be no curvature of the kind here treated of; or in other words, that erosion is the *sine quâ non* of this disease; that although there can be no true curve without caries, yet there is, and that not infrequently, caries without curve.

That the caries with curvature and useless limbs, is most frequently of the cervical or dorsal vertebræ, the caries without curve, of the lumbal, though this is by no means constant or necessary.

That in the case of carious spine without curvature, it most frequently happens, that internal abscesses, and collections of matter are formed, which matter makes its way outward, and appears in the hip, groin, or thigh; or being detained within the body, destroys the patient: the real and immediate cause of whose death is seldom known, or even rightly guessed at, unless the dead body be examined.

That what are commonly called lumbal and psoas abscesses, are not infrequently produced in this manner, and therefore, when we use these terms, we should be understood to mean only a description of the course, which such matter has pursued in its way outward, or the place where it makes its appearance externally, the terms really meaning nothing more, nor conveying any precise idea of the nature, seat, or origin of a distemper subject to great variety, and from which variety its very different symptoms and events in different subjects, can alone be accounted for.

That contrary to the general opinion, a caries of the spine is more frequently a cause, than an effect of these abscesses.

That the true curvature of the spine from within outward, of which the paralytic, or useless state of the lower limbs, is a too frequent consequence, is itself but *one* effect of a distempered spine; such case being always attended with a number of complaints, which arise from the same cause: the generally received opinion, therefore, that all the attending symptoms are derived from the curvature, considered abstractedly, is by no means founded in truth, and may be productive of very erroneous conduct.

That when two or more vertebræ are affected, forming a large curve, however perfect the success of the treatment may be with regard to the restoration of health and limbs, yet the curvature will and must remain, in consequence of the union of the bones with each other.

That the useless state of the limbs is by no means a consequence of the altered figure of the spine, or of the disposition of the bones with regard to each other, but merely of the caries: of this truth there needs no other proof, than what may be drawn from the cure of a large and extensive curvature, in which three or more vertebræ were concerned: in this the deformity always remains unaltered and unalterable, notwithstanding the patient recovers both health and limbs.

Pott contends, that a morbid state of the parts, previous to deformity, caries, or curve, must be allowed. All the general complaints of persons afflicted with this disorder, he says, will, upon careful inquiry, be found to have preceded any degree of deformity, to have increased as the curve became apparent, and to have decreased as the means used for relief took place; the pain and tightness about the stomach, the indigestion, the want of appetite, the disturbed sleep, &c. &c. gradually disappear, and the marks of returning health become observable before the limbs recover the smallest degree of their power of moving.

On the other hand, is admitted to be as true, that when from extent, or degree, or inveteracy of the caries, the issues are found to be unequal to the wished-for effect, the general complaints receive no amendment; but increase until the patient sinks under them.

If all this be true, says Mr. Pott, and it be found that the issues are capable of effecting a perfect cure, even after a caries has taken place, and that to a considerable degree, is it not reasonable to conclude, that the same means, made use of in due time, might prove a preventive?

Besides the forms of disease of the spine treated of in this article, the observations of Mr. Wilson prove, that the distemper may sometimes begin within the theca vertebralis, and thence extend to the bones. He also demonstrated, at the College of Surgeons, scrofulous tumours in the spinal marrow. Such diseases would create a loss of power in the parts below them, without any curvature of the spine. (*Lectures on the Skeleton, &c. p.* 397.)

In France, the same indication is followed as that on which Mr. Pott lays stress, viz. to endeavour to arrest the disease of the spine by means applied in the vicinity of the morbid parts. But instead of employing caustic issues, the moxa is used, and sometimes repeated cupping near the affected bones; both which means were particularly recommended by Desault.

Another practice, which yet has partisans, though it was strongly disapproved of by Pott, is that of supporting the spine with machinery. Perhaps the latter author may have carried his objections to this method beyond all reason, and with the exception of Dr. Harrison, (see *Lond. Med. and Physical Journ. Nov.* 1820,) I believe no modern practitioner now ever advises it on the supposition of there being any *dislocation;* an error which formerly prevailed. As Mr. Brodie observes, certainly no machines ought ever to be employed for the purpose of elon gating the spine and correcting the deformity: but if they be used simply to take off the weight of the head, chest, and upper extremities, from the diseased part of the spine, they may sometimes be of service. The late Sir James Earle had a very favourable opinion of their utility. I believe, with Mr. Brodie, that they ought never in the first instance to supersede the constant maintenance of the horizontal position; but that they may be advantageous, when circumstances make it desirable that the patient begin to sit up a part of the day. (*On Diseases of the Joints, p.* 291.)

From Mr. Pott's own account, it will be seen, that he never pretended that issues, kept open in the vicinity of the disease, were infallible; and a late eminent surgeon has actually referred the good which Pott thought accrued from them, to the long observance of the horizontal posture. Mr. Baynton, the gentleman to whom I allude, also mentions, that M. David is the only writer who has suggested that rest would affect the cure of diseases of the spine. On this point, however, Mr. Baynton was entirely mistaken, as, about eighteen years ago, Loder wrote some remarks, particularly directed to the object of recommending quietude in the present disease, as the best means of promoting anchylosis. (See *Med. Chir. Beobachtungen, p.* 251; *8vo. Weimar,* 1794.)

Now, although I fully concur in the propriety of keeping the patient as quiet as possible in the recumbent position, inasmuch as motion must be hurtful to the diseased part of the spine, it does not follow, that because this admission is made, that issues should be rejected, and that rest must do every thing. In one part of Mr. Baynton's reasoning, an error prevails, which I shall here notice, as it seems greatly to have influenced his opinions; and as far as I know it has not been remarked by the critical examiners of that gentleman's book. The mistake is in supposing, that the process by which the diseased part of the spine is to be restored and united, should be conducted exactly on the same principles as the union of bones free from disease. In fact, there is an additional indication, which is to stop the progress of the disease, for which purpose, experience proves that issues, *aided by rest,* are the means affording the best chances of success. I have attended several children myself, who, from the effect of issues, recovered the use of their lower extremities, even though they could not be kept constantly at rest. I must also give my testimony to the truth of Mr. Brodie's statement, that many patients are benefited almost immediately the issues are made, or uniformly find themselves better after each application of the caustic. (*On Diseases of Joints, p.* 282.) In some cases, however, caustic issues fail to affosd relief; and when they are of no use, rest in the horizontal posture, below ground, I believe must soon be the patient's doom. Whether the occasional failure of issues is to be ascribed to the advanced progress which the disease has made, or to its having begun in the cancellous structure of the vertebræ, as suggested by Mr. Brodie, future observation must decide.

Consult *Pott's Chirurgical Works, Vol.* 3. *G. Gebb, Select Cases of the Disorder, commonly termed Paralysis of the Lower Extremities,* 8vo. *Lond.* 1782. *C. H. Wilkinson, Essays on Distortion of the Spine, &c.* 8vo. *Lond.* 1798. *Loder, Med. Chir. Beobachtungen, B.* 1, *p.* 247, *&c.* 8vo. *Weimar,* 1794. *J. C. Frank, Oratio de Vertebralis Columnæ in Morbis Dignitate; Paviæ,* 1791. *C. Van Roy, De Scoliasi,* 4to. *Lugd.* 1774. *Sir J. Earle, Observations on the Cure of Curved Spine; in which the effect of Mechanical Assistance is considered,* 8vo. *Lond.* 1803. *Giuseppe Bergamaschi, Osservazioni sulla Inflammazione dello Spinale Medollo e delle sue Membrane;* 4to. *Par.* 1810. *T. Baynton, An*

Account of a Successful Method of Treating Diseases of the Spine; 8vo. Bristol, 1813. *H. Earle, in Edinb. Med. and Surg. Journ. for January,* 1815. *J. L. Choulant, Decas Pelvium Spinarumque Deformatarum; 4to. Lips.* 1818. *G. Malseh, de nova Machina Graefiana Distortiones Spinæ Dorsi ad Sanandas, necnon Disquisitio Deformitatum istarum; 4to. Berol.* 1818. *Abercrombie, in Edinb. Med. and Surg. Journ. for January,* 1818. *Kapeler, in Annuaire Med. Chir. des Hôpitaux de Paris, T.* 1, *p.* 390; *4to. Paris,* 1819. *T. Copeland, Obs. on the Symptoms and Treatment of Diseased Spine; 8vo. B. C. Brodie, Pathological and Surgical Observations on the Joints, p.* 257, *&c. 8vo. Lond.* 1818. *James Wilson, Lectures on the Structure and Physiology of the Skeleton, and on the Diseases of the Bones and Joints; p.* 395, *8vo. Lond.* 1820.

VINEGAR. (See *Acetic Acid.*)

VINUM OPII. Take of extract of opium ℥i, cinnamon bark bruised, cloves bruised, of each ʒj; wine a pint. Macerate for eight days, and filter. The thebaic tincture, or liquid laudanum of Sydenham. In surgery, it is often preferred to the common tincture of opium, as an application to the eye.

VIPER, BITE OF. See *Wounds.*

VOLVULUS. (from *volvo*, to roll up.) See *Intussusception.*

W.

WART. Mr. Hunter observes, that a wart appears to be an excrescence from the cutis, or a tumour formed upon it, by which means it becomes covered with a cuticle, which is either strong and hard, or thin and soft, just as the cuticle is which covers the parts, from which the excrescence arises. Warts are radiated from their basis to their circumference. The surface of the radii appears to be pointed, or granulated, like the surface of healthy granulations, with the exception of being harder, and rising higher. The surface on which the wart is formed, seems only to be capable of producing one; for the surrounding and connecting surface does not throw out a similar substance. Thus, when a wart has once begun to grow, it rises higher and higher, without becoming larger at its basis. Such excrescences seem to have within themselves the power of growing; for, as Hunter remarks, after they have risen above the surface of the skin, on which their basis cannot grow larger, they swell out into a round thick substance, which becomes rougher and rougher.

In consequence of this structure, warts are very liable to be hurt by bodies rubbing against them, and from such a cause, they often bleed very profusely, and are rendered sore and painful. (*On the Venereal Disease, p.* 250, *Edit.* 2.)

As warts are adventitious substances, and not any part of the original structure of the body, their powers of life are weak. Hence when stimulated, they generally become smaller, and at length altogether disappear, or drop off.

On this principle, warts may frequently be cured by the application of the sulphate of copper, or a powder, composed of the powders of savine leaves and the subacetate of copper, in equal proportions.

However, the employment of stronger escharotics, like the nitrate of silver, or the concentrated acetic acid; the removal of such excrescences with a knife, or pair of scissors; or tying their necks with a ligature, is a mode frequently preferred, because the cure is sooner accomplished.

The two last methods are eligible, when the wart has a narrow neck; but after the removal of the excrescence, it is still proper to touch the root with the caustic, or the acetic acid; for unless the whole be completely destroyed, the wart will inevitably grow again.

Warts on the pudenda, and about the anus, scarcely ever withstand the effect of the powder of savine, and subacetate of copper, though they will sometimes resist a course of mercury, adequate to cure lues venerea; a consideration, which led Mr. Hunter to believe them not to be syphilitic. In this opinion, I believe all the best surgeons of the present day concur.*

WHITLOW. (*Panaris, Onychia, Panaritium, Paronychia.*) A whitlow is an inflammation, about the end of the finger, exceedingly painful, and very much disposed to suppurate. The toes are also sometimes the seat of the disease.

Writers usually divide whitlows into four kinds. In the first, or mildest, a vesicle, filled with matter, commonly arises near the root, or side of the nail, after a superficial inflammation of trivial extent. The matter is situated immediately under the cuticle. Sometimes the abscess takes place under the nail, in which case, the pain is severe, and not unfrequently shoots upward, as far as the external condyle.

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* The ligature is as effectual and convenient as any method recommended, for the removal of warts. But as warts have seldom necks sufficient to retain the thread, I have been in the habit of resorting to a plan which I have always found successful, to the entire removal of warts. Take a fine sewing needle, armed with strong silk, and pass it through the centre of the tumour at its base, taking care to go deep enough, that the whole disease may be included, then by tying this at each side, of sufficient tightness to interrupt the circulation, the wart will drop off within the week, without inconvenience to the patient. From the manner in which the ligatures are applied, there is no possibility of their coming off, until the disease come with it. In this way, I have freed a hand from a dozen at one time, to the great satisfaction of the individual; and when removed in this manner, I have never found them recur. *Am. Ed.*

The second kind of whitlow is chiefly situated in the cellular substance under the cutis, and, for the most part, occurs at the very end of the finger. In this sort of case, the inflammatory symptoms, especially the pain, are far more violent than in other common inflammations of not greater extent. However, although the pain is thus severe, it does not in general extend far from the part affected. Writers usually impute the violence of the pain, and the considerable degree of inflammation attending the complaint, to the hard and unyielding nature of the skin on the finger. To the same cause they also ascribe the difficulty of perceiving any fluctuation after matter is formed; and the slowness with which the pus makes its way outward.

The third kind of whitlow is distinguishable from the others by the following circumstances. With the most excruciating pain, there is very little swelling in the affected finger, but a vast deal in the hand, particularly about the wrist, and over the whole fore-arm. The pain extends to the hand, wrist, elbow, and even the shoulder. When suppuration takes place, a fluctuation can never be felt in the finger, though it may very often be distinctly perceived in the hand, at the wrist, or even somewhere in the fore-arm. The case is frequently accompanied with considerable fever. The disease is seated in the tendons and their sheaths, and the power of moving the fingers, and even the whole hand, is lost.

Authors describe the fourth kind of whitlow as arising principally from an inflammation of the periosteum. The case is attended with one peculiarity, which is, that, however violent the pain may be, it never extends to the hand and fore-arm, nor is there any external swelling of the affected finger. Suppuration generally follows very soon, the usual consequence of which is a caries, or rather a necrosis, of the subjacent finger-bones.

Whitlows commonly begin on the inside of the fingers; but they do occasionally commence on the back of these parts, and even on that of the hand. Though pain about the wrist is usually the effect of inflammation in the finger, Acrel mentions a case in which the disorder was altogether confined to the hand itself. (*Vorfälle*, 2 *B. p.* 191.)

Mr. Wardrop has favoured the public with an account of a particular species of whitlow, which, from its malignant character, he has denominated the *onychia maligna.* "The commencement of this disease is marked by a degree of swelling, of a deep red colour, in the soft parts at the root of the nail. An oozing of a thin ichor afterward takes place at the cleft formed between the root of the nail and soft parts, and at last the soft parts begin to ulcerate. The ulcer appears on the circular edge of the soft parts at the root of the nail; it is accompanied with a good deal of swelling, and the skin, particularly that adjacent to the ulcer, has a deep purple colour. The appearance of the ulcer is very unhealthy, the edges being thin and acute, and its surface covered with a dull yellow, or brown-coloured lymph, and attended with an ichorous and very fetid discharge. The growth of the nail is interrupted, and loses its natural colour, and at some places appears to have but little connexion with the soft parts. In this state (says Mr. Wardrop) I have seen the disease continue for several years, so that the toe, or finger, became a deformed bulbous mass. The pain is sometimes very acute; but the disease is more commonly indolent, and accompanied with little uneasiness. The disease affects both the toes and the fingers. I have only observed it on the great toe, and more frequently on the thumb, than any of the fingers. It occurs, too, chiefly in young people; but I have also seen adults affected with it." (*Wardrop, in Med. Chir. Trans. Vol.* 5, *p.* 135, 136.)

The causes of whitlows are generally of a local nature. Writers enumerate the following as the most common: a contusion; suddenly warming the finger when it is exceedingly cold; pricks with needles, or other sharp instruments; and the insinuation of irritating matter into scratches on the finger. A surgeon, in operating for a fistula in ano, has been known to cut his finger, and have, in consequence of the accident, a very severe and dangerous kind of whitlow. Richter also mentions a person who had a most obstinate whitlow, in consequence of a slight wound on the finger, in examining the head of a horse that had the glanders. Sometimes the cause of a whitlow depends on a splinter, or thorn, which continues lodged in the part. Very often, no particular cause whatever can be assigned for the complaint.

The first case, which occurs about the root of the nail, ought to be opened as soon as possible. When this plan is not adopted, the matter is apt to penetrate more deeply, reach the root of the nail, and occasion a loss of this part. When an effectual opening is not made, the matter collects again. In general, a detachment of the cuticle takes place as far as the abscess extends. When the inflammation has been very violent, and the matter has made its way as far as the root of the nail, the nail itself is in general gradually detached, while the denuded portion of the root of the nail acts on the sore as a foreign body, and hinders it from healing. Hence the surgeon should repeatedly cut away as much of the lower edge of the nail as he can, and insinuate a little soft lint between the margin of the nail and the sore, in order to keep the latter from being irritated by the former. In proportion as the old nail gradually separates, a new one makes its appearance.

When matter lies under the nail, an opening should be made through the part as speedily as possible, for the discharge of the abscess. In order to perform this operation, Richter advises the surgeon to scrape the nail with a piece of glass, till it is as thin as it can well be, when it may be cut through with a bistoury.

In the second species of whitlow, suppuration may sometimes be prevented, and the inflammation be resolved, by the timely employment of proper means. When the pain is violent, and acute fever prevails, it may be adviseable to bleed the patient. In a few severe cases, the application of three or four leeches to the affected finger has been known to procure prompt relief (*Schmucker.*) Theden thinks, that applying a roller round the finger, hand, and arm, and frequently wetting the first two parts with a lotion, the most certain means of resolving the inflammation. Platner advises the finger to be for some time immersed in water as warm as the patient can bear. Some recommend the external use of camphorated spirit, or the volatile alkali; while others advise the affected finger to be plunged in a warm solution of soap, or kali. When the whitlow is occasioned by a prick, particular care must be taken that no extraneous substance remain in the puncture.

When the symptoms do not lessen by the fourth day, Richter recommends an opening to be made. Even when no fluctuation is discovered, he approves of making a crucial incision in the seat of the pain, and he states, that although no matter may be discharged, the patient always derives infinite relief from the operation. The benefit, he says, may either be imputed to the bleeding, or to the division of the hard tense skin which compresses the subjacent inflamed parts. Sometimes the collection of matter can be plainly felt, and, in this case, there can be no hesitation about the place where the opening should be made. However, it may be proper to remark, that the opening should always be made sufficiently large. When the surgeon makes a small puncture, it soon closes again, and a repetition of the operation becomes necessary. When opening the abscess is delayed, the theca of the flexor tendons easily becomes affected, or the matter may spread to a considerable extent under the skin. Sometimes it makes its way through the cutis by ulceration, and raises up the cuticle. In this case, as soon as the cuticle has been opened, a director should be introduced into the aperture in the skin, and the latter opening be enlarged with a bistoury.

The third species of whitlow seldom affects the last phalanx of the fingers; but, generally, the second or third. In this case, Richter enjoins us never to defer making an opening longer than the third day. If we wait till suppuration happens, we shall wait till the tendons are destroyed, and the use of the finger lost. In the case under consideration, the matter is always of bad quality, and very small in quantity. A fluctuation in the finger can seldom be felt. However, in a few instances, the matter is perceptible at the extremity of the finger, or about the finger-joints, but, more often, in the palm of the hand, or near the wrist. In these circumstances, the tendons are in general already destroyed, and a stiffness of the finger and hand is to be apprehended. When the complaint is the consequence of a puncture, the best plan, according to Richter, is at once to enlarge the wound; for, in this sort of case, all other methods are unavailing. It is not enough, however, to cut through the skin; the tendinous theca itself must be laid open.

When a collection of matter forms towards the wrist, attended with violent pain in that situation, an opening must also be made there. If an opening should have been already made in the hand, a probe may be introduced into the wound, and another aperture made in an eligible situation, by cutting on the end of the instrument. In the same way, Richter advises an opening to be made in any part of the fore-arm, where great pain, or the symptoms of suppuration, may indicate its propriety.

In the fourth kind of whitlow, early incisions, made down to the bone, are the most certain means of obviating the danger. When such incisions are not made early enough, suppuration takes place, and the bone becomes carious. The cut is to be made in the place where the pain is most severe. When the first phalanx is affected, the incision may be made in front of the finger; but when the second or third is the seat of the complaint, the opening should be made on one side. However, in order that the opening may be useful, it is absolutely necessary to make it down to the bone. When the incision is delayed too long, a small quantity of unhealthy matter is usually detected, and the bone is found in the state of necrosis. As an exfoliation can hardly be expected in this situation, it is best to remove at once the diseased piece of bone. When the last phalanx alone is affected, the finger retains its form, with the exception of its end being a little shorter and flatter. When the disease, however, is situated in the third phalanx, Richter thinks it better to amputate the finger than remove the diseased bone, as the finger, if left, would always remain stiff and unserviceable. (See *Anfangsgr. der Wundarzneykunst, Vol.* 7.)

With regard to the treatment of the species of whitlow, named by Mr. Wardrop, *onychia maligna*, all local applications have, in many instances, proved quite ineffectual, and the part been amputated. The only local treatment, which Mr. Wardrop has ever seen relieve this complaint has been the evulsion of the nail, and afterward the occasional application of escharotics to the ulcerated surface. I have myself seen a similar plan occasionally succeed, and the applications which appeared to answer best were arsenical lotions, Plunket's caustic, or a very strong solution of the nitrate of silver. Nothing, however, will avail, till the nail is removed, and its total separation sometimes takes up a good deal of time, unless the patient submit to the great pain of having it cut away.

Mr. Wardrop tried with success the exhibition of mercury in four cases of the onychia maligna. The medicine was given in small doses at first, and afterward increased, so as to affect the gums in about twelve or fourteen days. When the system was in this state, the sores in general soon assumed a healing appearance, and the bulbous swelling gradually disappeared. (See *Med. Chir. Trans. Vol.* 5, *p.* 138.)

WOUNDS. A great deal of the subject of wounds has been already considered in the articles, *Gunshot Wounds; Head, Injuries of; Hemorrhage; Hydrophobia; Parotid Duct; Sutures; Tetanus; Throat;* &c.

A wound may be defined to be a recent solution of continuity in the soft parts, suddenly occasioned by external causes, and generally attended at first with a greater or lesser degree of hemorrhage.

Wounds in general are subject to a considerable variety in their nature, degree of danger, facility of cure, and the consequences which are to be apprehended from them. Some wounds are perfectly trivial, not extending more deeply than the skin and cellular membrane; while others are more serious, penetrating the muscles, tendons, large blood-vessels, and nerves, of importance. There are also certain wounds which are not confined to the soft parts, but injure even the bones; such are many sabre-wounds, which frequently separate at once both a portion of the scalp and the subjacent part of the skull. Many wounds of the head, chest, and abdomen, injure the organs contained in those cavities. In short, the varieties, and the degree of danger, attending wounds in general, depend very much upon some of the following circumstances. The extent of the injury; the kind of instrument with which it has been inflicted; the violence which the fibres of the part have suffered in addition to their division; the size and importance of the blood-vessels and nerves which happen to be injured; the nature of the wounded part in respect to its general power of healing favourably or not; whether the operations of the system at large, and life itself, can be well supported or not, while the functions of the wounded part are disturbed, interrupted, or suspended by the accident; the youth or old age of the patient; the goodness or badness of his constitution; and the opportunities which there may be of administering proper surgical aid, and assistance of every kind.

Wounds are distinguished by surgical writers into several kinds; viz. *incised, punctured, contused, lacerated, poisoned,* and *gunshot wounds.* They also make another equally important division into *Wounds of the Head, Thorax, Abdomen, &c.*

Of gunshot wounds, and wounds of the head, an account has already been given. (See *Gunshot Wounds,* and *Head, Injuries of.*) The other cases I shall now proceed to consider.

Incised Wounds. As a general observation, it may be stated, that, *cæteris paribus,* a wound, which is made with a sharp cutting instrument, which is, in short, a mere incision, is attended with less hazard of dangerous consequences, than any other kind of wound whatever. The fibres have only been simply divided; they have suffered no contusion nor laceration; consequently, they are less likely to inflame severely, or to suppurate, or slough; and they commonly admit of being united again in a very expeditious manner.

Generally simple incised wounds bleed more freely, then contused and lacerated ones, which at first sometimes scarcely pour out any blood at all, although considerable blood-vessels may be injured. But this circumstance, apparently diminishing the danger of contused and lacerated wounds, is deceitful, and serves rather to render the case in reality more perilous, by inducing the inexperienced practitioner to be off his guard against hemorrhage. Thus, in gunshot wounds, it often happens, that on their first occurrence, the bleeding is trivial; but the side of some large artery having suffered great violence at the time of the accident, it may ulcerate or slough, a week or ten days afterward, and an alarming and even fatal effusion of blood be the result.

In cases of simple incised wounds, the bleeding which at once takes place from all the divided vessels, is a source of very useful information to the surgeon, inasmuch as it enables him to judge, what danger is to be apprehended from the hemorrhage, whether the cut vessels are large enough to demand the ligature, or, on the contrary, whether they are such as will cease to bleed, either by slight pressure, or of their own accord.

In a recent simple incised wound, there are three objects which the surgeon should endeavour to accomplish, without the least delay. The first, and that which requires his immediate interference, is the bleeding, which must be checked. The second is the removal of all extraneous matter from the surface of the wound. The third is the reunion of the opposite sides of the injury.

When the divided vessels are not above a certain size, the bleeding soon spontaneously ceases, and no surgical measures need be taken on this particular account. When the wounded vessels are even somewhat larger, and their situation is favourable for compression with a bandage, it is often adviseable to close the wound and apply compresses and a roller, rather than have recourse to ligatures, which always create a certain degree of irritation and suppuration. However, though I have made this observation, I should be exceedingly sorry to appear at all against the general preference to ligatures, whenever the wounded arteries are above a certain magnitude. In this circumstance, tying the bleeding vessels is the only safe mode of proceeding. When the artery is of considerable size, and its mouth can be readily seen, the most proper instrument for taking hold of it is a pair of forceps. In applying the ligature, the surgeon must take care to pull its ends in such a manner, that the noose will not rise above the mouth of the vessel, and for the purpose of altering the direction of the force employed in tightening the ligature, the ends of the thumbs are generally made use of. The tenaculum is commonly employed for taking up arteries, which are not large and distinct.

Very fine ligatures, of sufficient strength, are at present often applied, as well to large as small vessels. One half of each ligature should always be cut off, before the wound is closed, and there are some surgeons, who prefer the method of cutting off all the ligature, except what forms the noose immediately round the artery. (*Delpech, Mém. sur la Pourriture d'Hôpital, p.* 29; *Lawrence in Med. Chir. Trans. Vol.* 6, *p.* 156.) To the latter plan, however, a few surgeons have adduced objections, particularly Mr. Guthrie, who only admits the utility of it in cases where the wound will not unite by the first intention; (*On Gunshot Wounds, p.* 94.) and Mr. Cross, of Norwich. (See *the London Medical Repository, Vol.* 7, *p.* 353.) The experiments of Mr. Cross tend to the following conclusions:

First, If the wounds do not unite by the first intention, the ligatures may escape with the discharge, without any inconvenience.

Secondly, If common ligatures of twine are cut short, the wound may unite over them, and they may be found in abscesses after an interval of many weeks.

Thirdly, If the finest dentist's silk be employed in the same way, and the wound unite over it, the ligature may be detached from the vessel, and remain buried in an abscess, where it will be found at different periods, from one to seven months; and this may happen, whether the vessel be firmly compressed with a single ligature, or divided between two ligatures, so as to imitate the circumstances under which vessels are tied after operations.

Fourthly, If Indian silk, fine as hair, be put round a vessel so as to diminish its diameter, or to effect its obliteration, by just compressing its sides together, it may remain in this situation, without exciting abscess, or producing any inconvenience. The ligature may be thus applied to compress an artery for the cure of aneurism; but not to secure vessels divided in operations. If a thin ligature be drawn sufficiently tight upon a vessel on the face of a stump to be secure, Mr. Cross is persuaded, that the extremity of the vessel which becomes insulated, as it were, must die. (See *Lond. Med. Reposit. Vol.* 7, *p.* 363.) It deserves attention, that the preceding inferences are chiefly founded on experiments made upon asses and dogs. For further observations, see *Aneurism, Hemorrhage, Ligature, Surgery, &c.*

The bleeding having been suppressed, the next object is to remove any extraneous matter, such as dirt, bits of glass, clots of blood, &c. from the surface of the wound. Were this circumstance neglected, the plan of uniting the opposite sides of the cut by the adhesive inflammation, or by what is more frequently termed, union by the first intention, would in general be frustrated.

As soon as attention has been paid to the foregoing indications, the surgeon must put the lips of the wound in contact, and take measures for keeping them in this state, until they have grown firmly together. The sides of incised wounds are kept in a state of apposition by means of adhesive plaster, a proper position, the pressure of a roller, and in a few particular instances, by the employment of sutures.

With respect to sutures, as they create pain, irritation, and some degree of suppuration, they ought never to be employed when the parts can be kept in contact without them. However, certain cases require them, and it is admitted by many experienced surgeons, that in sabre-wounds of the ears, eyelids, nose, and lips, it is proper to use them. (See *Assalini's Manuale di Chir. Parte Seconda, p.* 10.) An account of the several kinds of sutures, with remarks on their employment, will be found in the article *Sutures.*

The best and most common method of keeping the surfaces of divided parts in contact is by means of strips of adhesive plaster. When they are to be applied, the surgeon should put the wounded limb or parts in the position, which is most favourable to bringing the lips of the wound together. With this view, a position should generally be chosen which relaxes the skin and subjacent muscles. An assistant should then place the edges of the wound as evenly together as possible, and hold them in this state, until the surgeon has secured them in this condition by strips of adhesive plaster, applied across the line of the wound. In general, it is deemed adviseable to leave a small interspace of about a quarter of an inch between each two strips of plaster, by which means the matter cannot be confined in case of suppuration. Over these first strips, lint is to be applied, and kept in its place with other pieces of adhesive plaster. Then, if necessary, a pledget and compresses are to be put on the part, and, lastly, the bandage, or roller is to be applied.

In this manner, the fresh-cut surfaces are brought into contact, and to preserve them quietly in this state, is the next great aim which the surgeon should have in view. The wounded part should be laid in the posture which was found the most favourable for approximating the sides of the cut at the time of applying the dressings, and the patient should be directed to keep the part in a perfectly quiet state.

When attention is paid to these circumstances, it often happens that the two opposite surfaces of the wound grow together again in the course of forty-eight hours, without any degree of suppuration. The process by which this desirable event is accomplished, is well known among surgeons, by the name of *union by the first intention.* Besides the advantage of the cure being effected in this way with the greatest expedition possible, there is still another thing much in favour of constantly promoting this method of healing wounds, which is, that the scar is much less than after any other mode of cicatrization, and the part is covered with original skin, which is always much stronger than any which can be formed as a substitute for it.

It is wonderful with what celerity union by the first intention takes place under favourable circumstances. In the course of three days, the large wound made in the operation of amputation, is frequently all healed, except just where the ligatures are situated.

When the two sides of the wound have been brought together, before the oozing of blood has entirely ceased, Mr. Hunter conceives that blood itself becomes the first bond of union; but on this point, Professor Thomson, of Edinburgh, entertains a doubt; and all practical surgeons agree, that the lodgment of blood on the surface of a wound, is more likely to prevent than promote the union of the parts. In all common instances, what Mr. Hunter calls the adhesive inflammation takes place. In this process, coagulating lymph either issues from the half-closed mouths of the vessels, or from the surface of the opened cells of the cellular substance. This becomes the first uniting medium, and very soon afterward, in some inexplicable manner, a vascular intercourse is established between the opposite sides of the wound.

The power which parts of the animal body have, of thus growing together, is strikingly evinced by the possibility of removing a part of one body, and then uniting it to some part of another. In this latter case there can be no assistance given to the union on one side, since the detached part, as Mr. Hunter observes, can hardly do more than just preserve its own living principle, and accept of union. In this way, says the same writer, the spurs of the young cock can be made to grow on his comb, or on that of another cock; and its testicles, after having been removed, may be made to unite to the inside of any cavity of an animal.

Every one initiated in surgery has heard of the feats of Taliacotius, Garengeot, and others, who are said to have succeeded in effecting the union of parts, which were completely severed from the body. Several other not less extraordinary performances by modern surgeons are recorded. (See *Observations on Adhesion, with two Cases, demonstrative of the Powers of Nature to reunite parts, which have been by accident totally separated from the animal System, by Wm. Balfour*, 8vo. *Edinb.* 1814.) Indeed the well-known practice of transplanting the teeth, the experiments of Duhamel and Hunter; and the number and respectable character of the testimonies upon this subject, fully convince me of the *occasional* success, which may attend the endeavour to bring about such an union. Experience also fully proves the *frequent* success which attends an endeavour to unite a part, which retains only the slight connexion of a small piece of flesh, or even a few fibres. My friend, Mr. Lawrence, lately had a case which illustrates the truth of this statement. A man on the top of a stage-coach, was carried under a gateway which did not leave sufficient room for him to pass without injury, and his head was so much wounded, that one of his ears was entirely separated, with the exception of an attachment by a trivial piece of integuments. Mr. Lawrence assented to the man's wish of not having the separation completed, and fixed the part in its situation with a few sutures. The consequence was that the ear soon united again, and the patient escaped all disfigurement. Of the knowledge of the disposition of living cut surfaces to grow together with considerable expedition, surgeons, both of ancient and modern times, have availed themselves not only in the treatment of accidental wounds, but also in the removal of deformity, as exemplified in the cure of fissures in the palate or lips, (see *Harelip*,) but most particularly in the curious and interesting art of forming new under-lips and noses, and closing large deficiences in the urethra with flaps of flesh, raised from the adjacent parts, shaped according to circumstances, and laid directly down upon a fresh-cut surface purposely prepared, where it is steadily confined for a certain time with sutures, or simple adhesive plaster and pressure, as the nature of the case may indicate. Nay, sometimes, the flesh for the formation of the organ to be restored has even been taken from a distant part, as for instance, from the arm for the restoration of parts of the face. When this was done, the limb was confined in close contact with the raw surface formed on the face, until a union between them had been effected; a division was now performed with the scalpel, and the opportunity taken to shape the portion of the limb which was to be left behind, according as the part to be restored might be the ear, nose, or lip. At the present day, the flesh is usually taken from the adjacent parts; a connexion of the flap with the rest of the body is retained, so as to ensure some circulation of blood in it, and it is turned into any position which the circumstances may demand. (See *Gaspar Taliacotius, Chirurgia Nova de Narium, Aurium, Labiorumque Defectu, per insitionem cutis ex humero sarciendo, &c.* 8vo. *Francof.* 1598. *J. C. Carpue, an Account of Two successful Operations for restoring a lost Nose from the Integuments of the Forehead*, 4to. *Lond.* 1816. *Giuseppe Baronio, Degli Innesti Animali*, 8vo. *Milan. C. F. Graefe, De Rhinoplastice, sive Arte curtum Nasum ad Vivum restituendi, commentatio, quâ prisca illius ratio iterum experimentis illustratur novisque methodis ad majorem perfectionem perducitur*, 4to. *Berol.* 1818. *Sir A. Cooper, on Unnatural Apertures in the Urethra; Surgical Essays, Part* 2. *H. Earle, on the Re-establishment of a Canal in the place of a portion of the Urethra, in Phil. Trans. for* 1821. *A Case of restored Nose, by Mr. C. Hutchison. A Case of artificial Anus* *cured by G. F. Collier, in Med. and Physical Journ. for June*, 1820.

Mr. John Bell describes the process of adhesion to be this: either the arteries of the opposite surfaces inosculate mouth to mouth, or rather each cut-surface throws out a gluten; the gluten fills up the intermediate space; into that gluten the lesser arteries of each cut-surface extend themselves, and it is thus, perhaps, by the generation of a new intermediate substance, that the continuity and entireness of the part are so quickly restored. If any one point fail to adhere, there the wound must run into suppuration; because, says Mr. J. Bell, at that point there is a separation of parts, which is equivalent to a loss of substance.

The same writer observes, that there are, no doubt, accidents, both of the constitution and the wound, which will prevent adhesion. If the patient be of a bad habit of body; if he be lying in a foul hospital, in the midst of putrid sores, and breathing a contagious air; if he be ill of a fever, or flux, or any general disease; then the properties of the body being less perfect, the wound will not adhere. Mr. J. Bell also notices, that, if the wound be foul, made with a poisoned weapon, or left with foreign bodies lodged in it; or if a considerable quantity of blood be poured out into the cavity of the wound, or if there be a wounded lymphatic, or a wounded salivary duct, a wounded intestine, or a bleeding artery or vein, the immediate adhesion of the whole of the wound may be prevented. However, I cannot help remarking, that, though Mr. John Bell, in imitation of most surgical writers, sets down the wound of a lymphatic as preventive of the union of wounds, I cannot say, that I ever saw such an effect imputable to the cause just mentioned. Also, when an artery or vein is cut, and requires to be tied, the adhesion of the wound would be prevented only just where the ligature lies, and at no other point.

There is no wound, observes Mr. John Bell, in which we may not try with perfect safety to procure this adhesion; for nothing can agree better with one surface of the wound, than the opposite one, which has been just separated from it. They may immediately adhere together, and even if they should not do so, no harm is done, and the wound will yet suppurate as favourably, as if it had been roughly dressed with dry caddis, or some vulnerary balsam, or acrid ointment. If one part should suppurate, while one half adheres, then, says Mr. John Bell, one half of our business is done. In short, this simple duty of immediately closing a wound is both natural and safe. (*Discourses on the Nature and Cure of Wounds, Vol.* 1.)

Upon this interesting topic of the advantages of union by the first intention, the most enlightened surgeons of all Europe now begin to entertain only one opinion. The practice is generally adopted both in the treatment of accidental cuts, and of the wounds resulting from surgical operations. Thus Assalini, one of the best modern surgeons in Italy, begins his Manual of Surgery with the following axiom: "Wounds and injuries of the soft parts, produced by cutting instruments, from the trifling wound of a vein, made for the purpose of discharging a few ounces of blood, to the incision in the uterus for the extraction of the fœtus, inclusively, should all be united by the first intention. (See *Manuale di Chirurgia; Discorso Primo. Milano*, 1812.)

British surgeons have, indeed, been accused by M. Roux of indiscriminate partiality to the plan of uniting all incised wounds by the first intention, and his countryman Baron Larrey has wished the method to be discontinued after amputation, in order (as he states) to lessen the chance of tetanus. But the exceptions which these surgeons wish to make, are few, and few as they are, they are not likely to be established, since several of the circumstances, alleged as reasons for limiting so beneficial a practice, are hypothetical, and far from being clearly proved. (See *Roux, Mémoire et Obs. sur la Réunion immédiate de la Plaie après l'Amputation circulaire des Membres*, 8vo. *Paris*, 1814. *Larrey, Mém. de Chir. Mil. Tome* 4, 8vo. 1812—17.)

Sometimes the attempt to procure union by the first intention fails, even in cases of incised wounds: but, in this circumstance, no harm arises from the kind of practice which has been followed. The case, in fact, now falls into nearly the same state, as would have occurred, had no attempt at union been made at all. The patient has taken the chance of a quicker mode of cure; but he has not been successful, and he must now be cured by a process, which on account of its slowness he at first wished to avoid. It is to be observed also, that union by the first intention, if not spoiled by sutures, rarely fails so completely, that there is not a partial adhesion of some points of the wound. The moment when we observe pain, inflammation, and swelling of the wound, a separation or gaping of its lips, the stitches tense (when these have been used,) and the points where the stitches pass particularly inflamed, Mr. John Bell advises us to undo the bandages, draw out the sutures, and take away every thing, which acts like a stricture on the wound. These prudent measures, he observes, may abate the rising inflammation, and prevent the total separation of the skin, while an endeavour may still be made to keep the edges of the wound tolerably near each other by the more gentle operation of sticking-plasters.

However, when the inflammation rises still higher, and it is evident, that a total separation of the sides of the wound cannot be avoided, Mr. John Bell wisely recommends leaving the parts quite loose, and applying a large soft poultice; for, says he, should you in this critical juncture, persist in keeping the parts together with sutures, the inflammation, in the form of erysipelas, would extend over the whole limb, attended with a fetid and bloody suppuration. After the wound has been brought into a favourable state, another attempt may be made to bring the edges near each other, not with sutures, but strips of adhesive plaster, or the gentle application of a bandage.

Mr. John Bell concludes with remarking, that the suppuration, production of granulations, and all that follows, are the work of nature. The only thing that the surgeon can usefully do, is to take care of the health. When the wound does not suppurate favourably, the discharge generally becomes profuse, thin, and gleety. This state is to be amended by bark, wine, rich diet, and good air.

I shall conclude this subject of union by the first intention, with an extract from the writings of Mr. Hunter, who observes, that

"It is with a view to this principle of union, that it has been recommended to bring the sides (or lips) of wounds together; but, as the natural elasticity of the parts makes them recede, it has been found necessary to employ art for that purpose. This necessity first suggested the practice of sewing wounds, and afterward gave rise to various inventions in order to answer this end, such as bandages, sticking-plasters, and ligatures. Among these, the bandage commonly called the uniting bandage is preferable to all the rest, where it can be employed; but its application is very confined, from being only adapted to parts where a roller can be used. A piece of sticking-plaster, which has been called the dry suture, is more general in its application than the uniting bandage, and is therefore preferable to it on many occasions.

"I can hardly suppose (says Mr. Hunter,) a wound, in any situation, where it may not be applied, excepting penetrating wounds, where we wish the inner portion of the wound to be closed equally with the outer, as in the case of hare-lip. But even in such wounds, if the parts are thick, and the wound not large, the sides will seldom recede so far as to make any other means necessary. The dry suture has an advantage over stitches by bringing a larger surface of the wound together, by not inflaming the parts to which it is applied, and by neither producing in them suppuration nor ulceration, which stitches always do. When parts, therefore, can be brought together, and especially where some force is required for that purpose, from the skin not being in large quantity, the sticking-plaster is certainly the best application. This happens frequently to be the case after the removal of tumours, in amputation, or where the sides of the wound are only to be brought together at one end, as in the hare-lip; and I think the difference between Mr. Sharp's cross-stitch, after amputation, as recommended in his Critical Inquiry, and Mr. Allanson's practice, shows strongly the superiority of the sticking-plaster (or dry suture.) In those parts of the body where the skin recedes more than in others, this [illegible] becomes most necessary; and as the scalp probably recedes as little as any, it is therefore seldom necessary to apply any thing in wounds of that part; the practice will certainly answer best in superficial wounds, because the bottom is in these more within its influence.

"The sticking-plasters should be laid on in strips, and these should be at small distances from each other, viz. about a quarter of an inch at most, if the part requires close confinement; but when it does not, they may be at greater distances. This precaution becomes more necessary if the bleeding is not quite stopped; there should be passages left for the exit of blood, as its accumulation might prevent the union, although this does not always happen." If any extraneous body, such as a ligature, should have been left in the wound, suppuration will take place, and the matter should be allowed to vent at some of these openings, or spaces, between the slips of plaster. I have known a very considerable abscess formed in consequence of this precaution being neglected, by which the whole of the recently united parts has been separated.

"The interrupted suture, which has generally been recommended in large wounds, is still in use, but seldom proves equal to the intention. This we may reckon to be the only one that deserves the name of suture; it was formerly used, but is now in a great measure laid aside in practice, not from the impropriety of uniting parts by this process, but from the ineffectual mode of attempting it. In what manner better methods could be contrived, I have not been able to suggest. It is to be understood, that the above methods of bringing wounded parts together, in order to unite them, are only to be put in practice in such cases as will admit of it; for if there was a method known, which in all cases would bring the wounded surfaces into contact, it would, in many instances, be improper, as some wounds are attended with contusion, by which the parts have been more or less deadened; in such cases, as was formerly observed, union cannot take place according to our first principle, and therefore it is improper to attempt it.

"In many wounds, which are not attended with contusion, when we either know, or suspect, that extraneous bodies have been introduced into the wound, union by the first intention should not be attempted, but they should be allowed to suppurate, in order that the extraneous matter may be expelled. Wounds which are attended with laceration, although free from contusion, cannot always be united by the first intention, because it must frequently be impossible to bring the external parts, or skin, so much in contact, as to prevent that inflammation which is naturally produced by exposure. But even in cases of simple laceration, where the external influence is but slight, or can be prevented (as we observed in treating of the compound fracture,) we find that union by the first intention often takes place: the blood, which fills up the interstices of the lacerated parts, having prevented the stimulus of imperfection in them, and prevented suppuration, may afterward be absorbed.

"Many operations may be so performed as to admit of parts uniting by the first intention; but the practice should be adopted with great circumspection: the mode of operating with that view, should in all cases be a secondary, and not a first consideration, which it has unluckily been too often among surgeons. In cases of cancer, it is a most dangerous attempt at refinement in surgery.

"In the union of wounded parts by the first intention, it is hardly or never possible to bring them so close together at the exposed edges, as to unite them perfectly by these means; such edges are therefore obliged to take another method of healing. If kept moist, they will inflame as deep between the cut surfaces as the blood fails in the union, and there suppurate and granulate; but if the blood be allowed to dry and form a scab between, and along the cut edges, then inflammation and suppuration of those edges will be prevented, and this will complete the union, as will be described by and by.

"As those effects of accidental injury, which can be cured by the first intention, call up none of the powers of the constitution to assist in the reparation, it is not the least affected or disturbed by them; the parts are united by the extravasated blood alone, which was thrown out by the injury, either from the divided vessels, or in consequence of inflammation, without a single action taking place, even in the part itself, except the closing or inosculation of the vessels: for the flowing of the blood is to be considered as entirely mechanical. Even in cases where a small degree of inflammation comes on, it is merely a local action, and so inconsiderable, that the constitution is not affected by it; because it is an operation, to which the powers belonging to the parts themselves are fully equal. The inflammation may produce a small degree of pain, but the operation of union gives no sensation of any kind whatever." (*Hunter on the Blood, Inflammation, and Gunshot Wounds.*)

Contused and Lacerated Wounds.—Lacerated wounds are those, in which the fibres, instead of being divided by a cutting instrument, have been torn asunder by some violence, capable of overcoming their force of adhesion. The edges of such wounds, instead of being straight and regular, are jagged and unequal.

The term *contused* is applied to those wounds which are occasioned by some blunt instrument, or surface, which has violently struck a part of the body.

These two species of wounds greatly resemble each other, and as they require nearly the same kind of treatment, writers usually treat of them together.

Lacerated and contused wounds differ from simple incised ones, in appearing, at first view, much less alarming than the latter, while, in reality, they are infinitely more dangerous. In simple cut wounds, the retraction of the parts, and the hemorrhage, are generally much more considerable than in a lacerated wound of the same size. However, notwithstanding these circumstances, they commonly admit of being healed with far greater ease. It is worthy of particular notice, that lacerated and contused wounds are not in general attended with any serious effusion of blood, even though large blood-vessels may be injured. I say in general, because in the year 1813, I saw a soldier, whose death was occasioned by a sudden effusion of a very large quantity of blood from the internal jugular vein, which vessel had been injured by a musket-ball, that first entered the integuments behind the mastoid process, and passed obliquely downwards and forwards towards the sternum. The blood did not issue externally; but formed betwixt the integuments and the trachea, a large dark-coloured swelling, which produced almost immediate suffocation. At the memorable siege of Saragossa, Professor Assalini saw a surgeon whose left carotid artery had been injured by a musket-ball, perish of hemorrhage in a few seconds. (See *Assalini's Manuale di Chirurgia, p.* 32, *Milano,* 1812.)

In most cases, however, there is little or no hemorrhage from lacerated and contused wounds, and it is a circumstance, which often leads inexperienced practitioners to commit great mistakes, by inducing them to promise too much in the prognosis which they make. Surgeons versed in practice, however, do not allow themselves to be deceived by the absence of hemorrhage, and, in proportion as there is little bleeding, they apprehend that the violence done to the fibres and vessels has been considerable. What is it, but the contused and lacerated nature of the wound, that prevents hemorrhage from the umbilical arteries, when animals divide the navel-string with their teeth? Whole limbs have frequently been torn from the body, without any hemorrhage of consequence taking place.

In the Phil. Trans. Cheselden has recorded a very remarkable case, in which a man's arm was suddenly torn from his body. Samuel Wood, a miller, had round his arm a rope, which got entangled with the wheel of the mill. He was lifted off the ground, and then stopped by a beam, which prevented his trunk from passing further; at this instant, the wheel, which was moving with immense force, completely tore, and carried away, his arm and scapula from his body. The appearance of a wound, occasioned in this manner, must of course be horrible, and the first idea, thence arising, must naturally be that the patient cannot possibly survive. Samuel Wood, however, escaped with his life. The limb had been torn off with such velocity, that he was unaware of the accident, till he saw his arm moving round on the wheel. He immediately descended by a narrow ladder from the mill, and even walked some paces, with a view of seeking assistance. He now fell down from weakness. The persons who first came to his assistance, covered the wound with powdered sugar. A surgeon, who afterward arrived, observing that there was no hemorrhage, was content with bringing down the skin, which was very loose, so as to make it cover the surface of the wound. For this purpose he used two cross stitches. The patient was conveyed the next day to St. Thomas's Hospital, and put under the care of Mr. Fern. This practitioner employed the usual means for preventing the bad symptoms most to be expected in this sort of case. The first dressings came away without any bleeding; no alarming consequences ensued; and the patient, in two months, completely recovered.

When the arm was examined, it was found, that the muscles, inserted into the scapula, were torn through near their insertions; while other muscles, arising from this bone, were carried away with it. The skin, covering the scapula, had remained in its natural situation, and seemed as if it had been divided precisely at the insertion of the deltoid muscle.

In La Motte's *Traité des Accouchemens*, may be found an account of a little boy, who, while playing near the wheel of a mill, got his hand, fore-arm, and arm, successively entangled in the machinery, and the limb was violently torn away at the shoulder joint, in consequence of the lad's body not being able to pass in the direction in which the arm was drawn. The bleeding was so trivial, that it was stopped with a little lint, and the boy very soon recovered.

In the fifth vol. of the Edinb. Med. Commentaries, may also be perused the history of a child, three years and a half old, whose arm was torn off by the wheel of a mill. Mr. Carmichael, who saw the child about an hour after the accident, found it almost in a dying state, with cold extremities, small faltering pulse, and all the right side of the body convulsed. However, there was hardly any bleeding. The arm was broken about an inch and a half above the elbow; the stump had a dreadful appearance; all the soft parts were in a contused and lacerated state, and the humerus was laid bare as high as the articulation, which was itself exposed. The skin and muscles were lacerated to a much greater extent, and in different directions. The remainder of the humerus was removed from the shoulder-joint by amputation, only as much skin and muscle being left as was sufficient to cover the wound. In two months the child was well.

In the *Mém. de l'Acad. de Chir. T.* 2, is an account of a leg being torn away at the knee-joint by a cart wheel. The patient was a boy, about nine or ten years of age. This accident, like the foregoing ones, was accompanied with no hemorrhage. The lower portion of the os femoris, which was exposed, was amputated, together with such portion of the soft parts, as was in a contused and lacerated state. The patient experienced a perfect recovery.

The preceding cases strikingly confirm the observation, which I have already made, in regard to the little bleeding, which usually arises from contused and lacerated wounds.

In these instances, the pain is also in an inverse ratio to the cause of the accident; it is generally very severe, when the wound is only moderately contused: and, on the other hand, the patient scarcely suffers any pain at all, where there has been so violent a degree of contusion, as at once to destroy the organization of the part.

When the bruised fibres have not been injured above a certain degree, the part suppurates; but such portions of the wound as have suffered greater violence, inevitably die, and are cast off in the form of sloughs. Granulations are afterward formed, and the breach of continuity is repaired by the process of cicatrization. (See *this word.*)

When a still greater degree of violence has been done, and, especially, when arteries of a certain magnitude have been injured, a mortification is too frequently the consequence. However, if the constitution be good, and the mischief not too extensive, the case may still end well. But, in other instances, the event is alarmingly dubious; for the mischief is then not limited to the wounded parts, which have suffered the greatest degree of contusion; but, too frequently, extends over such parts as were not at all interested by the wound itself.

The mortification arising directly from the impaired organization of parts, is not what is the most alarming circumstance. A still more dangerous kind of mortification, is that which is apt to originate from the violent inflammation occasioned by the accident. This consequence demands the utmost attention on the part of the surgeon, who must let no useful means be neglected, with a view of diminishing the inflammation before it has attained too high a degree, and very dangerous symptoms have commenced. In the first instance, he should not be afraid of letting the wound bleed a little, if it should be disposed to do so. The edges of the wound should then be gently drawn towards each other with a few strips of sticking-plaster, so as to lessen the extent of the exposed surface: but no sutures are proper. Indeed, the plan of diminishing the exposed surface of a contused wound with strips of adhesive plaster, is not invariably right; because their application creates a hurtful degree of irritation. The method is chiefly adviseable when there is a large loose flap of skin, which can be conveniently brought over the wound. In other cases, it is best to leave the parts free, uncompressed, and unconfined with any adhesive plaster, because if it were applied its irritation would do harm, and could not possibly procure any union of the parts. Under the most favourable circumstances, hardly any part of the wound can be expected to unite by the first intention:

the whole or the greater part of it will necessarily suppurate, after the detachment of the sloughs. The surface will then granulate, new skin will be formed, and the part heal just like a common wound. Perhaps, until the sloughs separate, the best application is a soft poultice, which should be put on cold, lest it bring on too great an oozing of blood.

Nothing, indeed, is so proper for checking any tendency to hemorrhage as cold applications, which are also the most effectual in preventing and diminishing the great degree of inflammation, which is one of the most dangerous consequences of this description of wounds.

No surgical writer, I think, has given more rational advice, respecting contused wounds, than that published by Professor Assalini. In general, says he, the treatment of contused wounds, whether they be simple and slight, or complicated and severe, requires the active employment of debilitating means in order to prevent inflammation. Cold water, and ice; and general and topical bleeding, are the things usually resorted to with success. Vulnerary lotions, camphorated spirit, and other spirituous applications, are improper, and if their pernicious effects are not always very evident, it is only because the contused injuries have been trifling, and in their nature perfectly easy of cure. In these cases, as well as in those of extravasations and glandular swellings, Assalini gives a preference to cold applications. The internal remedies and regimen, (says he) should also be adapted to the condition of the patient. A cannon-ball, at the end of its course, may come into contact with a limb, and fracture the bones, while the integuments have the appearance of being uninjured. Such cases are often attended with dreadful mischief in the soft parts around the bone, which generally sphacelate. This is an accident for which immediate amputation is mostly indispensable (see *Gunshot Wounds;*) but if any thing be capable of preventing inflammation and gangrene, it is an active debilitating plan of treatment, assisted with cold applications to the injured part. In such cases, the internal and external use of stimulants is approved of by many surgeons. But, Assalini prefers considering the state of the injured limb, just like what it is when affected with frost; and he thinks that the employment of stimulants will necessarily produce the same effect as caloric prematurely applied to parts deadened with cold. On the contrary, from the outward employment of ice and cold lotions in these cases, and in contused injuries in general, he has seen the greatest benefit derived.

Assalini conceives, that reason will be found to support this practice. The operation of cold, he says, retards the course of the blood, which meeting with only damaged vessels, augments the extravasation as it continues to flow. By lessening the temperature of the part, cold applications likewise diminish the danger of inflammation and sphacelus, at the same time that they have the good effect of rendering the suppuration, which must ensue, less profuse, than it would be, were not extravasation of blood, and violence of the inflammation, lessened by such applications, and a lowering plan of treatment.

Why, says Assalini, should not this method, which is generally adopted to prevent the effects of concussion of the brain after blows on the head, be, for analogous reasons, employed in examples of extravasation and commotion in other parts of the body? (*Manuale de Chirurgia, Parte Prima, p* 17.) Cold applications, however, in cases of contused wounds, are chiefly to be preferred, for the first day or two, in order to check the increase of extravasation and inflammation. After this period, I give a decided preference to an emollient linseed poultice, which will be found the most easy dressing during those processes, by which the sloughs are detached, the surface of the wound cleansed, and the origin of granulations established. When these changes have happened, the remaining sore is to be treated on the same principles as ulcers in general. See *Ulcers.*

Punctured Wounds.—A *punctured* wound signifies one, made with a narrow-pointed instrument, the external orifice of the injury being small and contracted, instead of being of a size proportionate to its depth. A wound, produced by a thrust of a sword, or bayonet, affords us an example of a punctured wound.

Wounds of this description are in general infinitely more dangerous than cuts, notwithstanding the latter have the appearance of being by far the most extensive. In cases of stabs, the greatest degree of danger always depends on the injury, and rough violence which the fibres have suffered, in addition to their mere division. Many of the disagreeable consequences are also to be imputed to the considerable depth, to which these wounds extend, whereby important parts and organs are frequently injured. Sometimes the treatment is rendered perplexing, by the difficulty of removing extraneous substances, as for instance a piece of the weapon, which has been left in the wound. Lastly, experience proves, that punctured wounds and stabs are particularly liable to be followed by a great deal of inflammation, fever, deep seated abscesses, sinuses, &c.

A strange notion seems to pervade the writings of many systematic authors, that all the danger and disagreeable consequences of punctured wounds are entirely owing to the narrowness of their orifices, which prevents suitable applications from being made to their bottom. Hence, it is absurdly recommended to dilate the opening of every stab, with the view, as is generally added, of converting the accident into a simple incised wound. Some of these writers are advocates for making the dilatation with a cutting instrument, while others, with equal absurdity, propose to enlarge the opening with tents.

Certain authors regard a punctured wound, as a recent sinus, and in order to make the inner surfaces unite, they recommend exciting a degree of inflammation in them, either by means of setons, or injections.

In the earliest edition of *The First Lines of the Practice of Surgery*, I have taken particular pains to expose the folly and errors, which prevail in most writings on this part of practice. In the above work, I have remarked, that if the notion were true, that an important punctured wound, such as the stab of a bayonet, could be actually changed into a wound, partaking of the mild nature of an incision, by the mere enlargement of its orifice, the corresponding practice would certainly be highly commendable, however painful. But the fact is otherwise: the rough violence, done to the fibres of the body by the generality of stabs, is little likely to be suddenly removed by an enlargement of the wound. Nor can the distance, to which a punctured wound frequently penetrates, and the number and nature of the parts injured by it, be at all altered by such a proceeding. These, which are the grand causes of the collections of matter, that often take place in the cases under consideration, must exist, whether the mouth and canal of the wound be enlarged or not. The time when incisions are proper, is when there are foreign bodies to be removed, abscesses to be opened, or sinuses to be divided. To make painful incisions sooner than they can answer any end, is both injudicious and hurtful. They are sometimes rendered quite unnecessary, by the union of the wound throughout its whole extent, without any suppuration at all.

Making a free incision in the early stage of these cases, undoubtedly seems a reasonable method of preventing the formation of sinuses, by preventing the confinement of matter, and were sinuses an inevitable consequence of all punctured wounds, for which no incisions had been practised at the moment of their occurrence, it would undoubtedly be unpardonable to omit them. Fair, however, as this reason may appear, it is only superficially plausible, and a small degree of reflection soon discovers its want of real solidity. Under what circumstances do sinuses form? Do they not form only where there is some cause existing to prevent the healing of an abscess? This cause may either be the indirect way, in which the abscess communicates externally, so that the pus does not readily escape; or it may be the presence of some foreign body, or carious bone; or lastly, it may be an indisposition of the inner surface of the abscess to form granulations, arising from its long duration, but removable by laying the cyst completely open to the influence of the air. Thus it becomes manifest, that the occurrence of suppuration in punctured wounds is followed by sinuses only when the surgeon neglects to procure a free issue for the matter, after its accumulation; or when he neglects to remove any extraneous bodies. But as dilating the wound at first can only tend to augment the inflammation, and render the suppuration more extensive, it ought never to be practised in these cases, except for the direct objects of giving free exit to matter already collected, and of being able to remove extraneous bodies palpably lodged. I shall once more repeat, that it is an erroneous idea to suppose the narrowness of punctured wounds so principal a cause of the bad symptoms, with which they are often attended, that the treatment ought invariably to aim at its removal.

Recent punctured wounds have absurdly had the same plan of treatment applied to them as old and callous fistulæ. Setons and stimulating injections, which in the latter cases, sometimes act beneficially, by exciting such inflammation as is productive of the effusion of coagulating lymph, and of the granulating process, never prove serviceable when the indication is to moderate an inflammation, which is too apt to rise to an improper height. The counter-opening, that must be formed in adopting the use of a seton, is also an objection. However, what good can possibly arise from a seton in these cases? Will it promote the discharge of foreign bodies, if any are present? By occupying the external openings of the wound, will it not be more likely to prevent it? In fact, will it not itself act with all the inconveniences and irritation of an extraneous substance in the wound? Is it a likely means of diminishing the immoderate pain, swelling, and extensive suppuration, so often attending punctured wounds? It will undoubtedly prevent the external openings from healing too soon; but cannot this object be effected in a better way? If the surgeon observes to insinuate a piece of lint into the sinus, and pass a probe through its track once a day, the danger of its closing too soon will be removed.

The practice of enlarging punctured wounds by incisions, and of introducing setons, is often forbidden by the particular situation of these injuries.

In the first stage of a punctured wound, the indication is to guard against the attack of violent inflammation. When no considerable quantity of blood has been lost, general and topical bleeding should be practised. In short, the antiphlogistic plan is to be followed. As no man can pronounce, whether such wounds will unite or not, and as no harm can result from the attempt, the orifice ought to be closed, and covered with simple dressings. In such cases, cold applications are also highly commendable. Whether gentle compression might be made to promote the adhesive inflammation or not, may be doubtful: I confess, that I should not have any reliance upon its usefulness. Perfect quietude is to be observed. When the pain is severe, opium is to be administered.

Sometimes under this treatment, the surgeon is agreeably surprised to find the consequent inflammation mild, and the wound speedily united by the first intention. "Numerous are the examples of wounds, which penetrate the large cavities, being healed by the first intention, that is, without any suppuration. Even wounds of the chest itself, with injury of the lungs (continues an experienced military surgeon and professor,) ought to be united by the first intention. (*Assalini, in Manuale di Chirurgia, parte Seconda, p.* 13.) More frequently, however, in cases of deep stabs, the pain is intolerable; and the inflammatory symptoms run so high as to leave no hope of avoiding suppuration. In this condition, an emollient poultice is the best local application; and when the matter is formed, the treatment is like that of abscesses in general. See *Suppuration.*

Poisoned Wounds: Bite of the Viper.—If we exclude from present consideration the bites of mad dogs, and other rabid animals, which subject is fully treated of in the article *Hydrophobia*, wounds of this description are not very common in these islands. In dissections, pricks of the hand sometimes occur, and they are in reality a species of poisoned wound, frequently causing considerable pain and irritation in the course of the absorbents; swelling and suppuration of the lymphatic glands of the arm or axilla; and severe fever and constitutional irritation. An instance of the fatal consequences of such an injury must still be fresh in the recollection of the profession; and some others of yet more recent date have taken place in this metropolis. (See *London Medical Repository, Vol.* 7, *p.* 288.)

In many instances, however, surgeons wound their fingers in dissecting bodies, and no particular ill consequences ensue. The healthy and robust are said to suffer less frequently after such accidents, than persons, whose constitutions have been weakened by hard study, excesses, pleasure, or previous disease. It is remarked, also, that pricks of the fingers, met with in opening the bodies of persons who have died of contagious diseases, and where a virus or infectious matter might be expected to exist in such bodies, do not communicate the infection. Doubtless (observes Richerand) the activity of certain animal poisons, from which the venereal and several other diseases arise, is extinguished with life. (*Nosographie Chir. T.* 1, *p.* 102, 103. *Edit.* 4.)

With regard to the treatment of the pricks of dissecting scalpels, the surgeons of the continent recommend the immediate cauterization of the little wounds with a grain of caustic potassa, or the liquid muriate of ammonia. Tonic remedies, particularly wine, is prescribed, and great attention paid to emptying the bowels.

The stings of bees, wasps, and hornets, are also poisoned wounds, though they are seldom important enough to require the assistance of a surgeon. The hornet is not found in Scotland; but it is an inhabitant of several of the woods in England. Its sting, which is more painful than that of a bee, or wasp, is not, however, often the occasion of any serious consequences. The stings of all these insects are attended with a sharp pain in the part, very quickly succeeded by an inflammatory swelling, which, after a short time, generally subsides of itself. When the eye is stung, as sometimes has happened, the effects may be very severe, as is elsewhere noticed. (See *Ophthalmy.*) It has been lately observed, that the pain of the stings of venomous insects, like the bee, depends less upon the introduction of the sting into the part, than upon that of the venomous fluid. The experiments of Professor Duméril tend to prove, that when the little poison bladder, situated at the base of the sting, has been cut off, a wound with the sting then produces no pain. The poison flows from the vesicle through the sting at the instant when this passes into the flesh. The exact nature of this venomous fluid is not known. When applied to mucous surfaces, or even to the surface of the conjunctiva of the eye, it causes no disagreeable sensation; but when it is introduced into the skin, by means of a needle, it immediately excites very acute pain.

Oil, honey, spirits of wine, the juice of the plantain, and a variety of other local applications, have been extolled as specifics for the relief of the stings of insects. Modern experience, however, does not sanction their claim to this character. In fact, none of these applications either neutralize the poison, or appease with superior efficacy the pain of the sting.

These cases should all be treated on common antiphlogistic principles, and the most rational plan is to extract the sting, taking care, in the first instance, to cut off the little poison vesicle with scissors, lest in the attempts to withdraw the sting more of the virus be compressed into the part. The stung part should then be immersed for a time in ice-cold water, and afterward covered with linen, wet with the liquor plumbi acetatis dilutus. Were the inflammation to exceed the usual degree, leeches and aperient medicines would be proper. In short, as there is no specific for the cure of these cases, they are to be treated with common antiphlogistic means.

With regard to the bites of serpents, those inflicted by the rattle-snake of America, and the cobra di capello of the East Indies, are the most speedily mortal. Indeed, this is so much the case, that sometimes there is scarcely an opportunity of trying any remedies; and even when the patient is not destroyed thus rapidly, there is such general disorder of the nervous system, with repeated faintings and sickness, that medicines cannot well be retained in the stomach, at least for some time.

Mr. Catesby, in the Preface to his Natural History of Carolina, informs us, that the Indians, who, by their constant wanderings in the woods, are liable to be bit by snakes, know, as soon as they receive the injury, whether it will prove mortal or not. If it be on any part at a distance from large blood-vessels, or where the circulation is not vigorous, they apply their remedies; but if any vein of considerable magnitude be hurt, they quietly resign themselves to their fate, knowing that nothing can then be of service. Among the remedies on which they chiefly depend are seneka root, volatile alkali, and particularly strong doses of arsenic, as will be presently noticed again.

If we put out of consideration animals affected with rabies, the viper inflicts the worst poisoned wound ever met with in these islands. In fact it is an animal which inserts into the part which it bites a poison capable of exciting very serious consequences. The jaws of the viper are furnished with teeth, two of which in the upper jaw are very different from the rest. These, which are about three lines long, are covered for about two-thirds of their length, with a membranous coat or sheath, are of a curved shape, and articulated with the jawbone. When the animal is tranquil, and his mouth shut, they lie down with their points turned backwards; but they instantly project forwards when it is irritated, and about to bite. In them are, canals, which terminate by a very narrow fissure on their convex sides, a little way from their points. The rest of these fangs is very hard and solid; and the canal is usually filled with a transparent, yellowish fluid, the poison of the viper.

This venomous fluid is secreted by two glands, or rather by two clusters of glands, one on each side of the head, placed on the front of the forehead, directly behind the eye-ball, under the muscle, which serves to depress the upper jaw. Thus the muscle cannot act without pressing upon them, and promoting the secretion of the fluid, which they are destined to prepare. A little bag, or vesicle, connected to the base of the first bone of the upper jaw, as well as to the end of the second, covers also the roots of the curved fangs, and forms a receptacle for the venom.

The viper is chiefly found in hilly, stony, and woody districts, and seldom in flat or marshy places. It is not its nature to attack man, or large animals, except when provoked. Its venom is only employed for the destruction of smaller animals, such as mice, frogs, &c. which are usually swallowed whole, and to the digestion of which the venomous secretion is by some writers supposed to contribute. When, however, a viper is pursued, trod upon, taken hold of, or hurt, it immediately bites, and were it only on account of the shape of the fangs, the wound might be attended with very unpleasant effects; but it is certain of being so, by reason of the species of inoculation which complicates it, and of which the mechanism is as follows:

When a viper is about to bite, it opens its mouth very wide. The two curved fangs, which had previously lain flat down in the cavity of the membrane attached to their base, now project, and become perpendicular to the lower jaw. When the bite takes place, the poison is propelled through the fangs, by the contraction of the muscles, and the closure of the mouth, and is injected into the wound with a force proportioned to its accidental quantity at the time, and the vigour of the animal.

The bite of a viper is quickly followed by severe effects, some of which are local, and the others general; but it is with the former that the disorder invariably commences. At the instant of the bite, the bitten part is seized with an acute pain, which rapidly shoots over the whole limb, and even affects the viscera and internal organs. Soon afterward the wounded part swells and reddens. Sometimes the tumefaction is confined to the circumference of the injury; but most frequently it spreads extensively, quickly affecting every part of the limb, and even the trunk itself. A sanious fluid is often discharged from the wound, around which phlyctenæ arise, similar to those of a burn. After a short time, however, the pain abates considerably; the inflammatory tension changes into a doughy, or œdematous softness; the part grows cold; and the skin exhibits large livid spots, like those of gangrene. The general symptoms also come on with celerity; the patient is troubled with anxiety, prostration of strength, difficulty of breathing, and cold profuse sweats. Vomiting frequently occurs, and sometimes copious bilious evacuations from the bowels. These symptoms are almost constantly attended with an universal yellowness, and excruciating pain about the navel.

The effects occur in the same way in nearly all subjects, with some differences depending upon the particular irritability and constitution of the patient; the high or low temperature of the atmosphere; the greater or lesser anger of the viper; the number of its bites; the size of the reptile itself; the depth to which the fangs have penetrated; and whether the bitten part happens to be one of great sensibility, or was naked or not at the time of the accident. In general, weak, pusillanimous persons, of bad constitutions, and loaded stomachs, suffer more sudden and alarming ill consequences, than strong, healthy subjects, who view the danger without fear. Several bites are, of course, more dangerous than a single one; and, lastly, it has been remarked, that the venom of the viper is more active in summer than the spring.

A year or two ago, however, the newspapers recorded the death of a servant, from the inadvertent application of the poison to a scratch on his hand, as he was examining the fangs and venomous organs of a viper perfectly torpid in the winter season.

Severe, however, as the effects of the bite of a viper may be, they are far from being so perilous as they are commonly supposed to be. Indeed, the injury rarely proves fatal to an adult, even when inflicted by a viper in the middle of summer, the period when the animal is most active and vigorous. Exceptions to this common belief, however, are upon record. Thus in the year 1816, a woman, in France, aged sixty-four, was bit on the thigh by a viper, and died in thirty-seven hours, notwithstanding the internal use of the liquor ammoniæ, and the enlargement of the wound, and cauterization of it with this fluid. In this case, it is to be observed, that an hour elapsed before any thing was done. (See *Annales du Cercle Medicale, T.* 1, *p.* 43, 8*vo. Paris*, 1820.)

Fontana, therefore, was not exactly correct in concluding, that the bite of an ordinary viper will not prove fatal to a full-grown person, nor even to a large dog, though it does so to smaller animals. Five bites from three strong and healthy vipers were not able to kill a dog weighing sixty pounds; and as this dog was little more than a third part of the weight of an ordinary man, Fontana supposed that a single bite could never be fatal to an adult. He says, that he had seen a dozen cases himself, and had heard of fifty more, only two of which ended fatally. Concerning one of these cases, he could get no information; the other patient perished of gangrene, twenty days after the bite. The mortification began three days after the accident, the bitten place having been deeply scarified almost as soon as the injury was received. Fontana believes, that much of the faintness, &c. which ensues upon the bite of a viper, are the mere effects of terror. "Upon a person's being bit (says he) the fear of its proving fatal terrifies himself and the whole family. From the persuasion of the disease being mortal, and that not a moment is to be lost, they apply violent or hurtful remedies. The fear increases the complaint. I have known a person that was imperceptibly bit in the hands or feet, and who, after seeing the blood, and observing a viper near him, suddenly fainted away; one, in particular, continued in a swoon for upwards of an hour, until he was accidentally observed, and recovered out of it by being suddenly drenched in cold water. We know that death itself may be brought on by very violent affections of the mind, without any internal disease. Why may not people, that are bit, die from a disease, produced entirely from fear, and who would not otherwise have died from any complaint produced by the venom?" Although it must be owned, that Fontana bestowed a great deal of attention upon this subject, the above reasoning is hypothetical and inconclusive. If it were to be granted, that some very timid, delicate, or nervous people, die from fear alone, it could not be admitted, that the generality of people, bit by snakes, perish also from the violent effect of mental alarm.

Whenever the patient dies, the catastrophe is always ascribable to the quantity of venom inserted in the wound; the number of bites; their situation near important organs; and the neglect of proper means of relief. In ordinary cases of a single bite upon the extremities, the patients would get well even without any assistance; but the symptoms would probably be more severe, and the cure slower.

From some facts, recorded by Sir Everard Home, and observations made on the operation of the poisons of the black spotted snake of St. Lucia, the cobra di Capello, and the rattle snake, it appears, that "the effects of the bite of a snake, vary according to the intensity of the poison. When the poison is very active, the local irritation is so sudden, and so violent, and its effects on the general system are so great, that death soon takes place. When the body is afterward inspected, the only alteration of structure met with, is in the parts close to the bite, where the cellular membrane is completely destroyed, and the neighbouring muscles very considerably inflamed. When the poison is less intense, the shock to the general system does not prove fatal. It brings on *a slight degree of delirium, and the pain in the part bitten is very severe:* in about half an hour, *swelling takes place from an effusion of serum in the cellular membrane*, which continues to increase, with greater or less rapidity, for about twelve hours, extending, during that period, into the neighbourhood of the bite. *The blood ceases to flow in the small vessels of the swollen parts; the skin over them becomes quite cold; the action of the heart is so weak, that the pulse is scarcely perceptible, and the stomach is so irritable that nothing is retained by it. In about sixty hours, these symptoms go off; inflammation and suppuration take place in the injured parts;* and when the abscess formed is very great, it proves fatal. When the bite has been in *the finger*, that part *has immediately mortified.* When death has taken place, under such circumstances, *the absorbent vessels, and their glands have undergone no change, similar to the effects of morbid poisons*, nor has any part lost its natural appearance, except those immediately connected with the abscess. In those patients, who recover with difficulty from the bite, the symptoms, produced by it, go off more readily, and more completely, than those produced by a morbid poison, which has been received into the system." (*Sir E. Home, Case of a Man who died in Consequence of the Bite of a Rattle Snake, in Phil. Trans.* 1810.)

Numerous remedies for the bites of common vipers have obtained celebrity. According to certain writers, each of these remedies has effected wonderful cures; and yet, as Boyer well remarks, every one of them has been in its turn relinquished for another, the sole recommendation of which has frequently consisted in its novelty. Any of these boasted medicines, though of opposite qualities, cured, or at least seemed to cure, the patients, and the partisans of each considered, that he had a right to extol his own remedy as a specific, when the patient, to whom he administered it, was seen to recover perfectly, after suffering a train of severe symptoms. But the reason of this pretended efficacy becomes obvious, when one knows that the bite of a viper is of itself rarely mortal to the human subject, and that the severity of the symptoms materially depends upon the quantity of the venom in the wound. (*Boyer, Traité des Maladies Chir. T.* 1, *p.* 428.)

The treatment of the bite of a viper is divided into local and general means.

The local treatment has for its principal object the destruction of the venom; the prevention of its entrance into the vessels, or the removal of it from the wound.

Of scarifying the wound, I shall only say, that it promises no utility, if it be practised with a view of letting such dressings be applied, as are extolled as specifics; for we know, that there is no local application, which is entitled to this character. Fontana was an advocate for applying a ligature round the limb, in order to check the ingress of the venom into the circulation; and he thought, that he had seen much good result from this practice. Sir Everard Home is also of opinion, that "the only rational local treatment, to prevent the secondary mischief, is making ligatures above the tumefied part, to compress the cellular membrane, and set bounds to the swelling, *which only spreads in the loose parts under the skin*; and scarifying freely the parts already swoln, that the effused serum may escape, and the matter be discharged as soon as it is formed. Ligatures (he says) are employed in America, but with a different view, viz. to prevent the poison being absorbed into the system." (*Phil. Trans. for* 1810, *p.* 87.) At all events, if compression be employed, it should be so regulated as not to create any risk of gangrenous mischief, by its interruption of the circulation.

Suction of the wound has been proposed, and seems founded on reason; but experience, I believe, has determined little in its favour. A cupping-glass might be employed, but, probably, no mode of suction would succeed in extracting the whole of the poison.

The most certain method of removing the virus consists in the excision of the bitten part. This operation, however, would hardly be proper, unless done immediately after the injury, before much inflammation had come on. It is likewise a practice to which many patients would not assent, and even some surgeons may deem the proceeding too severe, in relation to the bite of the viper of this country. The bite might also be inconveniently situated for the excision of the parts.

Another plan, more commonly preferred is, that of destroying the envenomed part with caustic, or the actual cautery. When this is done in time, the poison is prevented from extending its irritation over the nervous system, through the medium of which all the worst symptoms are usually excited. The caustic and cautery may also have the effect of chymically destroying the venom itself, while they must tend to hinder its passage into the circulation, inasmuch as they destroy the neighbouring absorbent vessels. The caustic, which Fontana preferred, was potassa. But, as Boyer sensibly remarks, every caustic, of equal strength, must infallibly have the same effect, as its mode of operating is that of destroying the point of irritation, viz. the seat of the venom. In France, liquid caustics are preferred, the fluid muriate of antimony, the liquor ammoniæ, or the sulphuric, or nitric acid, because their action is quicker, and they more certainly penetrate to the bottom of the wound. (*Traité des Mal. Chir. T.* 1, *p.* 429.) Either of these liquids may be applied by means of a slender pointed bit of wood, which is to be dipped in it, and then introduced into the punctures, made by the fangs of the reptile. The piece of wood should be withdrawn, wet once more, and applied again. If a drop of the caustic can be inserted, so much the better. When the bite is very narrow and deep, the caustic cannot well be introduced, before the mouth of the wound is somewhat enlarged with a lancet. A little bit of lint may then be wet in one of the above fluids, and be pressed deeply into the wound.

After the caustic has produced an eschar, the best application is an emollient poultice.

It is not, however, every bite of a viper, that requires local treatment, even of this degree of severity. As Boyer observes, when the wound is superficial, the viper benumbed with cold; its poison considerably exhausted by its having previously bitten other animals; the swelling inconsiderable; and the patient neither affected with prostration of strength, nor pain about the præcordia; a few drops of ammonia may be introduced into the wound, and a small compress wet with the same fluid applied. Formerly, olive oil was considered, in England, one of the best applications for the bites of snakes, and its virtues were afterward extolled in France by Pouteau; but, says Boyer, it possesses no specific efficacy, as the experiments of Hunaud and Geoffroi have decidedly proved. (*Traité des Maladies Chir. T.* 1, *p.* 431.)

With respect to the general treatment, if we exclude emetics, of which Dr. Mead had a high opinion, when the patient was much jaundiced the favourite medicines are cordials, ammonia, and arsenic. The ancients employed theriaca, Mithridates, salt, and the carbonate of ammonia. Of all stimulants, however, the liquor ammoniæ is that which now obtains the greatest confidence; or else, the *eau de luce*, which only differs from the fluid ammonia, in containing a small quantity of the oleum succinatum. In France, this remedy is even at the present time regarded, as having the best claim to the title of a specific for the bite of a viper. (*Boyer, op. cit.*)

In France, Bernard de Jussieu first tried ammonia in the year 1747 (see *Hist. de l'Acad. des Sciences*, 1747;) since which time it has been extensively employed for the cure of the bites of vipers, both as an internal and external remedy. It had, however, been highly praised by Dr. Mead at a much earlier period.

A few drops of the remedy are to be exhibited every two hours; but, as it is very powerful, it must always be diluted with tea, or some other drink, or the mistura camphoræ. The dose, however, must depend upon the age and constitution of the patient, and the intensity of the symptoms. Four or five drops suffice for a person of weak, delicate, irritable habit; but twelve or fifteen may be given to stronger subjects, when the symptoms are violent. With ammonia, some practitioners order wine.

In St. George's Hospital, the man who was bit by the rattle-snake, kept for exhibition, took aperient medicines, the liquor ammoniæ, æther, the spiritus ammoniæ, comp. opium, and other stimulants; but without any apparent benefit. The disease followed that course which Sir E. Home has described as usual when the shock on the system is not directly fatal, and the mischief in the arm ultimately produced the man's death. (See *Phil. Trans.* 1810.)

From the following passage, in relation to the bites of snakes in general, it seems that Sir Everard Home, in 1810, had no confidence in any medicines which had then been duly tried. "The violent effects, which the poison produces on the part bitten, and on the general system, and the shortness of their duration, where they do not terminate fatally, (says he) have frequently induced the belief, that the recovery depended on the medicines employed; and, in the East Indies, eau de luce is considered as a specific.

There does not appear to be any foundation for such an opinion; for when the poison is so intense as to give a sufficient shock to the constitution, death immediately takes place, and where the poison produces a local injury of sufficient extent, the patient also dies, while all slighter cases recover. The effect of the poison on the constitution is so immediate, and the irritability of the stomach so great, that there is no opportunity of exhibiting medicines till it has fairly taken place, and then there is little chance of beneficial effects being produced. (*Sir E. Home, in Phil. Trans.* 1810.)

Fontana also had little faith in reputed antidotes; but it is to be noticed, that his observations refer only to the bites of vipers. "In no country (says he) through which I passed, could I ever find any two people or persons, bit by the viper, either in the mountains or valleys, that used the same remedies. Some used theriaca alone, either externally or internally applied; others common oil; a third set used stimulants, such as the strongest spirituous liquors; whilst others, on the contrary, tried every different kind of sedative. In short, there is hardly any active kind of medicine that has not been tried as a cure in this disease; while, at the same time, it is certain that, under all the varieties of application, none of the patients died." Hence Fontana concluded, that none of the remedies had any effect in curing the disease.

Later observations, however, tend to raise our hopes, that a medicine is now known which really seems to possess considerable efficacy against the bite, even of a very formidable kind of snake. From some facts recorded in Dr. Russell's History of Indian Serpents, on the authorities of Mr. Duffin and Mr. Ramsay, it appears that the Tanjore pill, of which arsenic is the chief ingredient, is exhibited with considerable success in India after the bites of venomous serpents: this information led Mr. Chevalier to propose the fair trial of arsenic.

Mr. Ireland, surgeon to the 60th regt. had formerly heard Mr. Chevalier recommend the trial of arsenic, and he was resolved to make the experiment whenever an opportunity offered. On his arrival in the island of St. Lucia, he was informed that an officer, and several men, belonging to the 68th regiment, had died from the bites of serpents, supposed to be the coluber carinatus of Linnæus.

The reader will find some interesting account of the serpent here alluded to, in a tract, which I have lately read, entitled *Monographie du Trigonocéphale des Antilles, ou Grand Vipère Fer-de-Lance de la Martinique, par A. Moreau de Jonnés,* 8*vo. Paris,* 1816.

Mr. Ireland also learnt, that every thing had been tried by the attending medical men to no purpose, as all the patients had died, some in six, and others in about twelve hours from their receiving the wound.

A case, however, soon came under Mr. Ireland's own observation, and as nothing that had been done before, seemed to have been of any service, he was determined to give arsenic a full trial.

"Jacob Course, a soldier in the York light infantry volunteers, was bitten in the left hand, and the middle finger was so much lacerated, that I found it necessary to amputate it immediately at the joint with the metacarpal bone.

"I first saw him about ten minutes after he had received the wound, and found him in a torpid, senseless state; the hand, arm, and breast of the same side were much swelled and mottled, and of a dark purple, and livid colour. He was vomiting, and appeared as if much intoxicated. Pulse quick and hard: he felt little or no pain during the operation.

"The wound being dressed, and the patient put to bed, I ordered a cathartic clyster, and the following medicine to be taken immediately. ℞ Liquor Arsenic. ʒij. Tinct. Opii, gt. x. Aq. Menth. Pip. ℥iss. which was added to half an ounce of lime-juice, and as it produced a slight effervescence, it was given in that state; this remained on his stomach, and was repeated every half hour for four successive hours. In the mean time, the parts were frequently fomented with common fomentations, and rubbed with a liniment composed of Ol. Terebinth. ℥ss. Liquor Ammon. ℥ss. and Ol. Oliv. ℥iss. The cathartic clyster was repeated twice, when the patient began to be purged; and the arsenical medicine was now discontinued. He had become more sensible when touched, and from that time he gradually recovered his faculties; he took some nourishment, and had several hours sleep.

"The next day he appeared very weak, and fatigued; the fomentation and liniment were repeated. The swelling diminished gradually; the natural colour and feeling returned, and by proper dressings to the wound, and attention to the state of his bowels, he soon recovered and returned to his duty."

Mr. Ireland recites about four other examples, in which arsenic was exhibited with similar success.

It deserves particular notice, that the liquor arsenici employed by Mr. Ireland, was prepared according to Dr. Fowler's prescription, which directs sixty-four grains of arsenic, and as many of the fixed vegetable alkali, to be dissolved in a sand heat, and the solution to be made an exact pint, so that two drachms contain one grain of arsenic in solution. (See *Med. Chir. Trans. Vol.* 2, *p.* 393, *&c.*)

Wounds of the Thorax.—The thorax is a cavity of an irregularly oval figure, bounded in front by the sternum, laterally by the ribs, posteriorly by the vertebræ of the back, above by the clavicles, and below by the diaphragm, a very powerful muscle, which forms a kind of partition between the cavity of the thorax, and that of the abdomen.

The diaphragm is not stretched across, in a straight direction, from one side of the chest to the other; but on the contrary, descends much further in some places than in others. If the cavity of the thorax be opened by a transverse section, about the middle of the sternum, the diaphragm appears, on examination, to be very prominent and convex towards its centre, while it sinks downward at its edges, towards all the points to which the muscle is attached. At its anterior, and most elevated part, it is fixed to the ensiform cartilage, whence, descending obliquely to the right and left, it is inserted, on both sides, into the seventh rib, all the lower ribs, and lastly, into the lower dorsal vertebræ. According to this description, it is obvious, that the cavity of the thorax has much greater depth and capacity behind, than in front; a circumstance which surgeons ought to be well aware of, or else they will be liable to give most erroneous opinions concerning wounds of the chest. For instance, a practitioner deficient in anatomical knowledge, might imagine that a weapon, pushed from above downward into the front of the chest, could never reach the lungs, after having penetrated the cavity of the abdomen. It is a fact, however, that no instrument could pass in this direction, even some inches below the highest part of the abdomen, without entering the chest.

The whole cavity of the thorax is lined with a membrane named the pleura, which is every where adherent to the bones which form the parietes of this cavity, and to the diaphragm. Each side of the thorax has a distinct pleura. The two membranes meet in the middle of the chest, and extend from the sternum to the vertebræ. In this manner two cavities are formed, which have no sort of communication with each other. By the two pleuræ, touching and lying against each other, a middle partition is formed, called the mediastinum. These two membranes are intimately adherent to each other, in front, the whole length of the sternum; but behind, where they approach the vertebræ, they separate from each other, so as to leave room for the aorta, œsophagus, &c. The heart, enclosed in the pericardium, occupies a considerable space on the left of the mediastinum, and all the rest of the chest is filled with the lungs, except behind, where the large blood-vessels, nerves, thoracic duct, and œsophagus, are situated. In the perfectly healthy state, the lungs do not adhere to the pleura; but in the majority of subjects, at least in this climate, who are examined after death, such adhesions are found in a greater or lesser degree. The disease may probably be occasioned by very slight inflammation; and as the surface of the lungs is naturally destined to be always in close contact with the pleura, and patients are frequently not suspected to have any thing wrong in the thorax, this morbid change being often accidentally discovered after death, in looking for something else; it may be concluded, that it does not produce any serious effects.

The thorax is subject to all kinds of wounds; but their importance particularly depends on their depth. Those which do not reach beyond the integuments do not differ from common wounds, and when properly treated, are seldom followed by any bad consequences. On the contrary, those which penetrate the cavity of the pleura, even by the slightest opening, may give rise to alarming symptoms. Lastly, wounds injuring any of the thoracic viscera, are always to be considered as placing the patient in a state of considerable danger.

From what has been said, it appears that wounds of the thorax are very properly divisible into three kinds; viz. 1. such as affect only the skin and muscles; 2. such as enter the cavity of the chest, but injure none of the viscera; 3. others, which injure the lungs, or some other viscus.

Superficial Wounds of the Thorax.—Immediately a surgeon is called to a recent wound of the chest, his first care should be to ascertain, whether the weapon has penetrated the pleura or not. In order to form a judgment on this circumstance, surgical writers recommend, 1. Placing the wounded person in the same posture in which he was when he received the wound, and then carefully examining with a finger, or probe, the direction and depth of the stab. 2. The examination, if possible, of the weapon, so as to see how much of it is stained with blood. 3. The injection of fluid into the wound, and attention to whether it regurgitates immediately, or lodges in the part. 4. The colour and quantity of the blood, discharged from the wound, are to be noticed, and whether any is coughed up. 5. We are to examine whether air escapes from the wound in respiration, and whether there is any emphysema. 6. Lastly, the state of the pulse and breathing must be considered.

In wounds of the chest, however, surgeons should not be too officious with their probes, merely for the sake of gratifying their curiosity, or appearing to be doing something. No judicious surgeon can doubt that authors have dwelt too much on the subject of probing wounds of the abdomen and thorax; for they would really lead their readers to believe, that, until the wound has been traced with the finger, or probe, to its very bottom and termination, surgeons are not qualified to institute any mode of treatment. The only advantage of knowing that a wound penetrates the chest, is, that the practitioner immediately feels himself justified in having recourse to bleeding and other antiphlogistic means, with the view of preventing inflammation of the pleura and lungs, which affection, if not controlled in time, often proves fatal. However, there can be little doubt that if the nature and depth of the wound cannot be readily detected with the eye, the finger, or a probe, or by the discharge of air, or blood, it is much safer to bleed the patient than to put him to useless pain with the probe, and waste opportunities of doing good, which too frequently can never be recalled. In short, generally speaking, it is better, and more advantageous for all patients, that some of them should lose blood, perhaps unnecessarily, than that any of them should die in consequence of the evacuation being omitted or delayed.

Almost all writers, who have taken pains to direct how wounds of the thorax should be probed, conclude with remarking, that, however advantageous a knowledge of the direction and depth of the wound may be, much harm has frequently been done by pushing the attempts to gain such information too far. It is, perhaps, of greater importance to learn, by some kind of examination, the extent of a wound, which does not reach beyond the integuments, or intercostals, than to know whether the wound extends into the cavity of the chest. For, even when the pleura is found to be divided, if the wound be attended with no urgent symptoms, the information is of no practical use, if we make it a rule to adopt, without the least delay, a strict antiphlogistic plan of treatment, in all cases in which there is any doubt or chance of the parts within the chest being wounded, and likely to inflame. Besides, frequently, the symptoms are more urgent and alarming than they could be were only parts on the outside of the thorax injured; and, under such circumstances, it is manifest that a probe cannot be necessary for discovering that the wound extends into the chest.

With respect to the injection of lukewarm water, or any other fluid, and the circumstance of its regurgitation, as a criterion of the wound being only superficial, the plan is more objectionable than the employment of a probe; for, if the liquid be propelled with force, it may be injected into the cellular substance, and seem to be passing through the track of the wound into the chest, while, in reality, not a drop does so. Besides, is it a warrantable proceeding to try to insinuate any quantity or kind of liquid whatever between the pleura and lungs, into a situation in which it must necessarily obstruct the important function of respiration, and cause serious inconvenience?

When air issues from the wound in expiration, there is ground for suspecting that the lungs are wounded. But I believe, that such authors as represent this circumstance as an infallible criterion of the nature of the accident, labour under a mistake; for when there is simply an opening in the chest, without any injury of the lungs whatever, the same symptom may occur. The air, which is discharged through the wound in expiration, has previously entered the bag of the pleura through the same wound in inspiration. In order to remove all doubt, the patient should be requested to expire, as strongly as he can, so as to force out whatever air may have accumulated in the chest. At the end of each expiration of this kind, care must be taken to bring the skin closely over the orifice of the wound, and to keep it thus applied, during each following inspiration, for the purpose of preventing the external air from entering. In this way, if there be no wound of the lungs, all the air will soon be expelled; but if it still continues to be discharged in expiration, the lungs must be wounded.

Sometimes, an emphysematous swelling takes place round wounds of the thorax, in consequence of a quantity of air diffusing itself in the cellular substance. In wounds, which are straight and ample, this symptom is very uncommon; but, in cases of narrow oblique stabs, and where the lungs are wounded by the points of broken ribs, it is by no means unfrequent. (See *Emphysema*.) When a considerable quantity of blood flows from the wound, there is reason for conjecturing, not only that the weapon has penetrated the cavity of the thorax, but that some of the thoracic viscera are injured. Excepting the intercostal arteries, which run along the lower edges of the ribs, and the trunks of the thoracic arteries, all the other vessels, on the outside of the chest, are very inconsiderable. The effects of compression will indicate, whether the blood escapes from an artery on the outside of the cavity of the pleura; and sometimes, the situation and direction of a wound at once denotes, that the hemorrhage cannot proceed from the trunks of the thoracic arteries.

Even the appearance of the blood, which comes from the wound, may lead to some conjectures, concerning the depth of the injury. The blood, which flows from wounds of the lungs, is of a brighter scarlet colour, and more frothy, than that which is discharged from the vessels of any other part.

There can be no doubt of the lungs being wounded, when the patient is observed to spit up blood; but, the absence of this symptom is not a positive proof of their being untouched, though unquestionably, a very important circumstance in the diagnosis, and, generally speaking, a correct criterion of the lungs having escaped injury. At all events, when no blood is spit, or coughed up, the lungs can never be deeply penetrated.

The state of the pulse, and that of respiration ought to be particularly attended to by the practitioner. Neither one, nor the other, seems altered, at least at first, when wounds do not reach more deeply than the integuments; but those which penetrate the cavity of the thorax, and especially such as injure the viscera, may frequently be distinguished, from the very first moment of their occurrence, by their effects on the sanguiferous system, and the function of respiration. When the lungs are wounded, at a point where they adhere to the pleura, no air can be effused in the thorax, and the functions of those organs may, on this account, suffer less disturbance than would be the consequence of an equal degree of injury at some other unadherent portion of the lungs. Experience proves, that when either air or blood insinuates itself between the lungs and the pleura, the lungs become immediately oppressed, the breathing is attended with great difficulty, the pulse is weak, contracted, and intermittent.

Wounds of the integuments and muscles of the thorax, are not attended with any particular danger; they heal with the same readiness, and by the same means, as common superficial wounds in any other part of the body.

When the case is a punctured, or a gunshot wound, some writers are advocates for laying open the track of the injury from one end to the other, if its course should not be too extensive, and they then recommend dressing the cavity down to its bottom. When the track of the wound was too extensive, a seton was sometimes introduced. The aim of such exploded practices was to prevent the outer part of the wound from healing too soon, and thus give time for the whole of it to heal in an equal degree. When a seton was used, the thickness of the skein was gradually diminished, and, after the whole of it had been removed, a slight compression was kept up for a few days, with the view of completing the cure.

The French surgeons have the discredit of having brought setons into fashion in this branch of surgery, and I am particularly glad, that a late writer has well exposed the absurdity of the practice. "We find (says Mr. John Bell) the history of it to be plainly this: that as Guy de Chauliac, Paré, and all the older surgeons, did not know how to dilate gunshot wounds, they found these same setons useful in bringing the eschar sooner away, and in preserving an open wound; and, as they believed the wounds to be poisoned, they took the opportunity of conducting, by these setons, whatever acrid medicines might, according to the prevailing doctrines of that time, have any chance of correcting the poison." Mr. J. Bell notices, how surprising it is to see the cruelty, and perseverance, with which some modern practitioners, particularly French, draw these cords through wounded limbs; and when the roughness of such a cord, or the acrimony of the drugs conveyed by it, produces a copious suppuration, these men are delighted with such proofs of their success. The setons have been introduced by the French surgeons, across the thickest parts of the limbs, along the whole length of the fore-arm, and, at the same time, frequently through the wrist-joint. The setons have also been covered with stimulating applications. Profuse suppurations, and dreadful swellings of course ensued; still, as Mr. J. Bell has remarked, these cruelties were continued, till the wound healed almost in spite of the pain; or till the coming on of very dreadful pain, great suppurations, convulsions, &c. made the surgeon discontinue the method, or even amputate the limb. The French have become so familiarized to setons, that they do not restrict their use to flesh wounds, they pass them quite across the thorax, across the abdomen, and even through wounds of the knee-joint.

When we wish to excite inflammation, in the cavity of the tunica vaginalis, for the purpose of radically curing a hydrocele, we either pass a seton through the part; lay it open with an extensive incision; cram a tent into it; or inject some irritating fluid into it. While the animal machine continues the same, says Mr. John Bell, the same stimuli will produce the same effects, and a seton, injection, or long tent, if they produce pain and inflammation in the scrotum, will not be easy in the chest; and, unless we can use them in the chest, with the same intentions with which we use them in the hydrocele, (in other words) unless we are justified in inflaming the chest, and causing an adhesion of all the parts, we cannot use them with any consistency or good sense.

With regard to the cases which the French adduce in confirmation of the good effects of their plans, I am entirely of opinion with Mr. J. Bell, that the facts only prove, that *the patients recovered in spite of the setons.* "It is like (adds this author) what happened to a surgeon, who was dabbing in the thorax with a piece of caustic which fell directly into the cavity of the chest, where it caused very large suppurations, and yet the patient was saved. The patient recovered, in spite of the caustic, just as M. Guerin's patient, and many other poor unhappy souls, who lived in spite of the setons. One would think, that people took a pleasure in passing setons across the eyeball, the chest, the knee-joint, &c. merely to make fools stare, when the business might be as effectually done with an abscess lancet."

Mr. John Bell, in his usual lively style, makes the employment of tents, in wounds of the chest, seem equally ridiculous and improper. Indeed, he says, *he knows of no occasion in all surgery, in which tents can be useful, except in the single one of a narrow opening, which we desire to dilate, in order to get at the bottom of the wound; and where either, on account of some great artery, or the fearful temper of our patient, we dare not use the knife.* (See *J. Bell on Wounds. Discourse 2, Vol. 2.*)

Having hitherto been engaged, rather in pointing out what ought not to be done, than what ought, I shall next make some remarks on the line of conduct, which should be adopted, in cases of wounds of the parietes of the chest.

When the wound is a common cut, the sides of the division are to be brought into contact, and maintained in this position with strips of adhesive plaster, compresses, and a bandage, until they have grown together. If the surgeon take care to relax such muscles as happen to be cut, or to be situated immediately under the wound of the integuments, there will rarely be any need of sutures.

As cut wounds seldom or never penetrate the chest, and there is generally no reason why they should not unite by the first intention, without being followed by extensive inflammation and abscesses, antiphlogistic means should be employed with moderation. Bleeding will not often be requisite. The grand objects are, to keep the patient in a quiet state, on rather a low diet, and to hinder him from taking wine, porter, spirits, or any other stimulating beverages.

If the wound, instead of healing favourably, should inflame, the treament should be regulated by the principles laid down in the article *Inflammation.* If it suppurate over its whole surface, but without a great deal of surrounding swelling and inflammation, one or two strips of sticking-plaster, may still be used with advantage; for, in this way, the cavity, which must now be filled up by granulations, will be rendered much smaller than it otherwise would be. Some very soft lint may be laid in the cavity of the wound, which the sticking-plaster does not entirely remove, and over the whole a pledget of some mild, unirritating ointment. No pressure is now proper, until the inflammation diminishes; and if the discharge should be profuse, or the surrounding inflammation considerable, the best application would be an emollient poultice. In this state of things, the patient should also be bled, and leeches be applied near the inflamed parts.

When the case is a stab, or punctured wound, the fibres of the divided parts are not simply cut, they are also considerably stretched, bruised, and otherwise injured. Hence, generally they will not admit of being united so readily, as the sides of a clean incision, made with a sharp instrument. However, the possibility of uniting the opposite sides of punctured wounds must depend very much on the shape of the weapon, and the suddenness, roughness, and violence, with which it was driven into the part. A prick with a needle is a punctured wound; so is that often made by surgeons with their lancets; yet, these injuries do not frequently bring on violent inflammation, and abscesses, as other wounds frequently do, which are inflicted with bayonets, and pikes.

Let us suppose a man to have received a thrust of a bayonet, which has run into the skin and muscles, covering one side of the thorax: what plan can the surgeon follow, with the greatest advantage to his patient?

Instead of laying open the whole track of such a wound with a knife, as is barbarously recommended in many of the principal works on surgery;[*] instead of drawing a seton through its whole course, or of cramming into the part a hard, irritating tent; the practitioner should take whatever chance there may be of uniting the wound without suppuration. For this purpose, he should recollect that the great degree of violence done to the parts in punctured wounds is the reason why they are so apt to inflame and suppurate. Hence the expected inflammation is to be counteracted in the very first instance; and immediately the wound is dressed, the patient should be freely bled, and take some saline purgative medicines. With regard to the dressings, the orifice of the wound may be lightly closed with sticking-plaster, or covered with any mild superficial applications. Over and around these, the surgeon may apply linen, kept continually wet with cold water, or the liquor plumbi acetatis dilutus. As, however, many patients have a strong dislike to cold applications to any wounds upon their bodies, it is often necessary to dispense with this practice. The dressings are to be retained with a roller; but it is not to be tight, as pressure is more likely to do harm, than good. Thus the inflammation of the wound will be moderated; the extravasation of blood prevented; the chance of union by the first intention taken; and all painful operations avoided. And, nothing is more certain than the fact, that, if antiphlogistic means be strictly employed, many stabs heal without abscesses, or any very severe symptoms, when no hope could be entertained of their doing so under other treatment. But, if suppuration should happen, and a collection of matter take place, would the patient suffer more, or be put into greater danger, by having a proper depending opening, of just sufficient size, now made into the abscess in an eligible place, than if he had submitted to have the formidable operation of laying open the whole extent of a stab, performed in the first instance? In short, will he suffer half so much, be half so long in getting well, or have to encounter half the danger? With all this advantage, he will have taken a certain chance, which attends all these cases, if the wound becoming united by what is called the first intention. that is to say, without any suppuration. I need not enlarge upon this subject, but refer the reader to what has been said in the preceding columns on the subject of *Punctured Wounds*, and to the treatment of abscesses, in the article *Suppuration*. Gunshot wounds, merely injuring the parietes of the chest, are to be treated according to principles elsewhere explained. (See *Gunshot Wounds.*)

Of Wounds penetrating the Cavity of the Thorax.—Penetrating wounds of the chest are always dangerous, and claim the utmost attention of the practitioner. I shall first treat of such wounds as enter the cavity of the thorax, but without injuring the viscera.

In the healthy state, the lungs so completely fill the thorax, that, both in inspiration and expiration, they are always in close contact with the pleura; and whenever air, blood, or any other matter, insinuates itself between the pleura costalis and pleura pulmonalis, more or less oppression and difficulty of breathing immediately take place. In all wounds attended with a division of the pleura costalis, and occurring in a situation where there happens to be no adhesion between this membrane and the lungs, some of the external air, or a small quantity of blood, or both, can hardly fail to get into the cavity of the thorax. If one of the intercostal arteries be wounded, and the external orifice be very narrow, the blood furnished by this vessel may pass into the chest, and immediately produce oppression of the breathing, and other symptoms of pressure on the lungs. Of what is to be done in this case, I shall presently speak.

When a wound is known to have entered the pleura, and there is no symptom leading to a suspicion that the lungs, or any large vessel, is wounded, the injury is to be dressed according to common principles, and the more superficially the better. Authors also usually direct us, just before we close the opening, to tell the patient to make a deep inspiration, for the purpose of expelling as much of the air as possible, which may have passed into the cavity of the pleura. At the end of such inspiration, the edges of the wound in the skin are to be brought together, and kept so with sticking-plaster, compresses, and a roller. The other indications are to prevent inflammation of the pleura and lungs by rigorous antiphlogistic remedies, particularly bleeding, which should be copious, and repeated as circumstances may require.

Penetrating wounds of the chest may be complicated with some of the following circumstances: 1. Foreign bodies. 2. Injury of one of the intercostal arteries. 3. Protrusion of a portion of the lungs. 4. Emphysema. 5. Extravasation of blood in the thorax.

1. Almost all these wounds occasion pain and difficulty of breathing. Many of them are also followed by an emphysematous swelling around the wound; the patient frequently coughs up blood; and after having had for some time a small, contracted, irregular pulse, with a pallid countenance and cold extremities, he is too often seized with severe febrile symptoms, the effect of inflammation of the lungs and parts within the chest. These symptoms should be counteracted by bleeding, a very low regimen, opening saline medicines, the use of leeches, or cupping, and the strict observance of quietude. If such indisposition should continue longer than a few days, without diminution, writers inform us, that there is ground for suspecting that they depend upon the presence of some foreign body. However, it may be doubted whether Sabatier's advice, immediately to make search after the extraneous substance, is proper under these circumstances. For my own part, I cannot think the symptoms above related by any means unequivocal, and even were they so, the practice would still be questionable. (See *Medecine Opératoire, Tom. 2, p. 244.*)

Sabatier has quoted the two following cases, for the purpose of showing what may be attempted in these cases.—"A man, twenty-seven years of age, was struck very violently with a knife on the outer part of the fourth true rib. Simple dressings were applied for the first few days; but a considerable coughing and spitting of blood ensuing, M Gerard was consulted, who found, that the symptoms depended on the presence of a piece of the knife, which had pierced the rib, and was projecting some way into the thorax. So little of the foreign body was on the outside of the rib, and it was so fixed in the bone, that it could neither be extracted with any kind of forceps, nor even moved in the least with a leader, mallet, &c. Although the only expedient seemed now to be that of sawing or cutting out the portion of the rib, Gerard conceived that an attempt might first be made to extract the foreign body, by pushing it from within outward. For this purpose, having put a steel thimble on his index finger, he introduced it into the cavity of the thorax, and thus succeeded in pushing out the piece of the knife.

A spicula of the bone was afterward felt; but it was too firmly connected with the rest of the rib to admit of being completely taken out. Gerard was absurd enough to *surround the whole rib at the splintered part with a ligature.* To these ingenious proceedings, as the French term them, was imputed, not only the cessation of all the bad symptoms, but a speedy recovery. (See *la Faye's Notes to the Traité des Opérations de Dionis.*)

An officer was shot in the left side of the chest. The ball entered about where the bone and cartilage of the seventh true rib unite, and came out in the situation of the angle of the same bone, which was broken in two places. The posterior part of the first false rib was also broken. Incisions were made, which enabled the surgeon to take away several splinters of bone, and facilitated (that mischievous French practice) the introduction of a seton. Soft mild dressings were applied. The patient was bled twenty-six times, with the view of relieving the fever, difficulty of breathing, and spitting of blood. On the fifth day, suppuration commenced, and the seton could be easily drawn. In about a fortnight, the patient's sufferings considerably abated, and he passed some of the ensuing days in a tolerably easy state. Circumstances, however, made it necessary to move him to another place, and on the twenty-fourth day, he had a bad night; febrile symptoms came on; and the discharge was not of its usual consistence. He was bled twice more, and his critical state led the surgeon to examine the wounds again. On passing a finger into the posterior wound, a foreign body was felt, and easily extracted. It was a piece of the patient's coat. A spicula of bone was also felt more deeply lodged, which required the wound to be dilated. Partial relief followed the removal of these extraneous substances.

On the thirtieth day, the bad symptoms recurred, two more bleedings were practised, and *as fears were entertained that the seton was doing harm*, it was suppressed. The patient now first made complaint of feeling something which pricked him, in a deep situation between the two openings of the wound. It was therefore determined to divide all the parts intervening between the two orifices, and occupying an extent of seven or eight inches. Guerin cut the parts between the two ribs, from within outward, under the guidance of his finger introduced into the posterior wound, care being taken not to cut near the lower edge of the upper rib. In this way, the whole track of the ball was laid open, and in the middle of it a very sharp splinter was found, projecting into the substance of the lungs. It was removed, and the wound dressed with simple applications. From this day all the bad symptoms ceased. (*Obs. de Guerin in Mem. de l'Acad. de Chir. T.* 2; 4*to*.)

Mr. John Bell has taken notice of the preceding case; he observes, that some of Guerin's steps were bold and good, as well as successful; but that the employment of the seton was wrong. The example teaches us several important circumstances: 1. The propriety of making very free dilatations for the extraction of splinters of bone. 2. The utility of repeated copious bleedings, which in the above case, indeed, had the greatest effect both in preventing such hemorrhage in the chest as would probably have produced suffocation, and also in averting a degree of pulmonary inflammation, which would have proved fatal.

Mr. John Bell judiciously condemns the seton: "Had M. Guerin (says he) been asked what good it was to do, it would have been difficult for him to have invented even a plausible apology for the practice, which, if it was not doing good, could not fail to do harm. Was this seton necessary for keeping the wound open? No, surely; for the wound could not have closed while it was irritated, and kept in suppuration by splinters of bone, and a piece of cloth within the breast. Was it to draw the piece of cloth out? Surely, in the course of twenty days, a piece of cloth would have had some chance at least of being floated towards the wound, either by the natural flux of the matter, or by the help of a mild injection. Was it useful in supporting the discharge? This would have been a sore question for M. Guerin; for it supported the suppuration only by inflaming the chest; and where inflammation of the chest, or high cough, or bloody expectoration, or a profuse discharge, were the chief dangers, a great seton could hardly be a comfortable inmate in the breast. I think one might very boldly promise to produce bloody expectoration and terrible cough, profuse suppurations, and oppression, to any degree, by drawing such a cord across a sound thorax."

Mr. John Bell next censures M. Guerin for not having discovered the pricking piece of bone before the thirty-eighth day; a disadvantage which he partly ascribes to the seton, the pain of drawing which across the chest deadened every lesser pain, and, consequently, the patient could not feel the trifling pricking of the bone, till his greater sufferings from the seton were allayed. "In short, (says Mr. John Bell,) M. Guerin passes a a great strap of coarse linen across the cavity of the chest, and when it causes inflammation, he thinks to subdue it by bleeding; when M. Guerin continued for thirty days drawing a coarse seton through the breast every morning, and bleeding for the cough every night, what did he do but raise inflammation with his left hand, to show how well he could cure it with his right?" (See *John Bell on Wounds, Vol.* 2, *p.* 36—38.)

The liability of wounds of the chest to be complicated with the lodgement of foreign bodies, is a circumstance of which the practitioner should ever be mindful. "In the examinations of the bodies of soldiers who have died from these injuries, (says Dr. Hennen,) I have frequently found pieces of wadding or clothes, spiculæ of bone, and balls, and, in one case, some charpie used as a dressing; either loose in various parts of the lungs, or lying in sacs, which the exertions of the constitution to free itself had thrown round them by the medium of the coagulating lymph. In the more fortunate few who have recovered, these matters have been discharged from the wounds, or extracted from them by the surgeon. In some lucky cases, they have been ejected by the convulsive efforts to cough, which their irritation has occasioned." (*On Military Surgery, Ed.* 2, *p.* 367.) For an account of the dexterity with which Larrey has sometimes traced balls in the chest, and extracted them by bold operations, I must refer to his valuable writings. (See *Mem. de Chir. Mil. T.* 4, *p.* 250, *&c.*) Balls have sometimes lodged and remained encysted in the lungs for upwards of twenty years, without the health being at all disturbed by their presence. (See *Percy, Manuel, &c p.* 125; *Boyer, Traité des Mal. Chir. T.* 7, *p.* 310, *&c.*)

2. When one of the intercostal arteries is wounded by a narrow oblique stab, the accident cannot at first be known. In this case, the blood commonly makes its way

into the cavity of the chest, where it causes a more or less considerable extravasation. But when the wound is ample, and direct, the effused blood, which has all the characters of arterial blood, leaves no doubt concerning the injury of an intercostal artery. However, if any uncertainty prevail, it may easily be dispelled, by introducing a finger into the wound, and making pressure with it on the lower edge of the rib, which corresponds to the vessel suspected to be injured.

Gerard proposed to stop hemorrhage from the intercostal artery, by means of a ligature. His plan was to enlarge the external wound, as far as the upper edge of the rib, corresponding to the wounded intercostal artery, and then to introduce into the chest a common curved needle, armed with a ligature, to which was attached a dossil of lint. The needle was passed behind the rib, rather higher than the superior edge of the bone. The point of the instrument was then pushed from within outward, and brought out through the external wound, together with the ligature. When the dossil had come into contact with the artery, the two ends of the ligature were tied over a thick compress, placed on the outside of the rib. In this manner, the bone was surrounded with the ligature, and the artery compressed.

Goulard, of Montpelier, having found difficulty in passing a common needle, whose shape little corresponded to the track, through which it had to pass, being curved towards its point, and straight towards the eye, invented one expressly for this operation. He also objected to the common bent needles, as he conceived that they might wound the lungs with their sharp points and edges. Goulard's needle formed three-fourths of a circle, and was fixed on a long handle, which facilitated its introduction. The eye, in which the ligature was put, was situated near the point, which was a little blunted, and the ligature lay in a groove, in the convexity of the instrument. When the needle had passed through the intercostal muscles, and its point had made its appearance over the rib, which was above the artery, the ligature was untied, and held, while the needle was withdrawn at the place where it had entered. The ligature was then tied, as in Gerard's method.

It was afterward thought, that compression might answer better than the foregoing use of the ligature. Lóttery, professor of anatomy in the university of Turin, constructed, for this purpose, a steel plate, which is described, and engraved in the second volume, 4to. of the Mémoires de l'Acad. de Chir. This plate was narrow at one end; broad at the other; and curved in two directions at its narrow part, where there were some holes, by means of which a compress for the artery was fastened on the instrument. The broad end of the plate had two long parallel slits, through which a riband was passed, with which the instrument was secured.

When the wound, corresponding to the intercostal artery, was sufficiently extensive in the transverse direction, the narrow, bent end of the instrument was so introduced, that the lower edge of the rib above was placed in the concavity of the curvature, while the compress acted on the edge of the bone, and, of course, on the artery. The rest of the instrument applied itself to the side of the thorax, in which situation it was fastened. When the wound was not ample enough, a sufficient dilatation of it was first made for the introduction of the instrument.

Quesnay employed a piece of ivory, which he covered with lint, &c. and then introduced within the chest. The instrument was then drawn from within outward, by means of a riband, and thus the necessary compression was produced.

Quesnay's plan is somewhat like that invented by Lóttery. But, to have introduced the compress entirely into the thorax, together with the ivory, which was the basis of it, and then to have drawn the contrivance from within outward, as was probably intended, a very large wound would have been indispensable. This was also one of the many strong objections to Lóttery's instrument, which, in fact, could only be employed when there was a free and ample opening.

Belloque, seeing the inefficacy of all the compressing means used before his time, and their inconveniences, invented an instrument, which, he says, is calculated for making proper pressure, and following the motion of the ribs, without hindering the escape of extravasated blood. The machine is engraved, and described, in 2 T. of Mém. de l'Acad. de Chir. 4to. It is composed of two plates, which are wadded, and capable of being brought towards each other by means of a screw. This instrument, as Sabatier observes, may indeed answer; but it is complicated and awkward, and its utility is founded on the supposition of the wound being larger, than wounds are, which are made with common weapons.

Justly averse to any unnecessary multiplication of surgical instruments, modern practitioners reject all particular contrivances for stopping hemorrhage from the intercostal arteries. Indeed, as the accident is very rare, it is probable, that, if the best instrument possible were devised, it would hardly ever be at hand, when required.

A common dossil of lint (says Sabatier,) fastened to a strong ligature, and introduced between the two ribs, or even quite into the chest, and then drawn, from within outward, like Quesnay's compress, would fulfil every desirable purpose. The external wound should then be covered with simple dressings, and a bandage applied round the body. The patient should be freely and repeatedly bled, and treated on the most rigorous antiphlogistic plan.

Professor Assalini joins all the best modern surgeons in reprobating the introduction of the preceding contrivances and extraneous substances into the chest, in order to stop hemorrhage from the intercostal artery. All these methods, he remarks, are calculated to excite a dangerous degree of inflammation in the chest. Hence he prefers simply cutting the artery across, so as to allow it to retract, and if this plan fail, he recommends the wound to be closed. Should the blood find its way into the chest, it is true, the consequences will be serious, but not fatal; and, if the symptoms require it, the operation of empyema may afterward be done. A small quantity of effused blood, however, may be absorbed, and no such proceeding be requisite. (*Manuale di Chirurgia, p.* 58, 59.)

Dr. Hennen conceives, that whenever the tenaculum *can* be used for an injured intercostal artery, the practice should be adopted. He states, that cases are reported in which the vessel was thus secured; but that he has never seen the method adopted himself. "Unfortunately, (says he) we but too often are disappointed in finding the source of the hemorrhage, and here judicious pressure is our only resource. In some very slight cases, I have used the graduated compress with success; but if the sloughing is extensive, nothing but the finger of an assistant, relieved as often as occasion may require, and pressure direct upon a compress placed along the course of the vessel, or so disposed as to operate upon its bleeding orifice, will be of any avail. (*Military Surgery, Ed.* 2, *p.* 377.)

3. The protrusion of a portion of the lungs, in consequence of wounds penetrating the chest, is a very unusual case: but there are some instances recorded by writers: and one case I attended myself after the battle of Waterloo. Schenckius relates an example, taken from Rolandus. The latter was called to a man, who had been wounded in the thorax, six days before. A portion of the lungs protruded in a state of mortification. Rolandus extirpated it, and the patient soon recovered.

Tulpius has recorded a similar fact. A man received an extensive wound, just below his left nipple. His naturally gay disposition, however, led him to neglect the injury; and on the third day a piece of the lungs, three inches in length, protruded. The patient went to Amsterdam, whence he was distant two days' journey, for the purpose of receiving succour in one of the hospitals of that city. The protruded piece of lung, which was already mortifying, was tied, and cut off with scissors. It weighed three ounces. The wound healed in a fortnight, and the patient experienced no complaint afterward, except a slight cough, with which he was occasionally troubled. He survived the accident six years, leading a wandering, drunken life. After death, nothing particular was observed in the thorax, except that the lungs had become adherent to the pleura, in the situation of the wound. Hildanus relates another case: a man was wounded with a knife, between the fifth and sixth ribs, near the sternum. As a piece of lung protruded through the opening, and had a livid colour, it was extirpated with the actual cautery. The wound was then dilated, and the ribs kept apart, with a wooden wedge, under which plan, the portion of lung, girt by the opening, shrunk within the chest. The patient was soon completely well.

A fourth example of a protrusion of a piece of lung through a wound in the thorax, is among the cases recorded by Ruysch. The servant of a seafaring man was wounded in the anterior and inferior part of the chest, and was immediately attended by a surgeon, who mistook the protruded piece of lung for a portion of omentum, and applied a tight ligature round it. Ruysch, who was consulted, soon detected the mistake which had been made, but he delivered his opinion, that the wound would heal very well, as soon as the tied piece of lung was detached. The event justified his prognosis, and the patient recovered.

When the protruded portion of lung is sound, the reduction ought to be made without the least delay. It should be done on the same principles as those on which protruded pieces of intestine, or omentum, are reduced. (See *Wounds of the Abdomen.*) A recurrence of the accident is to be prevented by closing the wound, and placing a compress over it. But when the piece of lung is already in a mortified state, in consequence of the constriction which it has suffered, or when its large size prevents reduction, Sabatier is of opinion, that the only resource is to extirpate the part, after applying a ligature round its base. If the latter step were not taken, a dangerous hemorrhage might follow, or even an extravasation in the thorax. (*Médecine Opératoire, Tom.* 2, *p.* 224.) However, the practice recommended by Sabatier appears questionable in the instance of mortification, because the dead part will naturally be thrown off by a spontaneous process; and when the wound is too small to allow the part to be returned, its dilatation might be more adviseable than the removal of a considerable portion, or even any, of the lung.

After the battle of Waterloo, I had a patient with a protrusion of a piece of lung, four or five inches in length. The part was much bruised, and could not be easily reduced. I therefore applied a ligature round its base, and cut it off. Previously, however, I made an incision in it, in order to ascertain whether it would bleed freely, which being the case, induced me to use a ligature. I was afterward informed by my friend Mr. Collier, that the man died.

4. Emphysema is another symptom with which penetrating wounds of the chest are frequently complicated, especially when they are small, and indirect. When such wounds are small, and not straight in their course; when their track is rendered impervious either by change in the situation of the muscles, the swelling of the parts,

clots of blood, or any extraneous substances; air may insinuate itself into the cellular substance, so as to cause a great deal of tumour and distention. Emphysema is easily distinguishable by the tumefaction of the part affected, without any pain, or change of colour in the skin, and by the crepitation which is perceptible on pressing the air from one part of the cellular substance into another. Emphysema may take place, where the lungs are not wounded, but in this case it can never be of much extent. Here the emphysematous swelling is caused by the air, which insinuates itself into the cavity of the thorax through the wound, during the first inspirations which follow the accident, and the same air is expelled in the subsequent acts of expiration. But when the lungs are wounded, the emphysema arises from the escape of air from those organs, during inspiration, first into the cavity of the thorax, and thence, through the inner opening of the external wound, into the cellular substance.

I should have deemed it unnecessary to have said any thing in this part of the work, on the present subject, and have contented myself with referring to the article *Emphysema*, were not the cause of this symptom rather perplexing, and did I not hope that the following extract from Sir A. Halliday's publication will tend to facilitate the comprehension of these cases. This gentleman mentions the following circumstances, under which air may escape from the lungs, or emphysema arise.

1st. "An injury or disease of the pleura pulmonalis, causing a wound or ulceration of that membrane, and thus allowing the air to escape from the lungs, as in oblique external wounds, where the outer opening, and that of the pleura costalis have healed, or closed up, and in ulcers of the surface of the lungs.

2dly. "The pleura pulmonalis, and pleura costalis, may be wounded or ulcerated when there is no external opening, as when the ends of fractured ribs penetrate through both into the substance of the lungs; and it is from this accident, &c. that emphysema most commonly takes place.

3dly. "The common integuments of the parietes of the chest, the intercostal muscles, and the pleura costalis may be wounded, while the plura pulmonalis and the lungs remain uninjured, so that the air admitted from without, and collected in the cavity of the thorax, may be pressed into the cellular membrane, so as to occasion emphysema."

The same writer remarks, "that the lungs in the thorax have often, and not unaptly, been compared to a bladder in a close pair of bellows; but if we suppose the bellows to be divided into two compartments, and each of these to contain a bladder, which mutually communicate with each other, and with the external air, by means of a tube which is exactly adapted to the nozzle of the bellows, and which admits the air only into the cavity of the bladders, and not into the space betwixt the bladders and bellows, we shall then have a perfect representation of the mechanical structure of the thorax. The bellows will represent the thorax, divided in the middle by the mediastinum; the bladders will represent the lungs of the right and left sides; and the tube, which communicates with the bladders and with the external air, will represent the trachea. The only thing which is wanting to render this mechanical representation perfect, is, that the bladders should exactly fill the bellows, so as to leave no air betwixt them and the bellows."

It is explained by Sir A. Halliday, that when the handle of the bellows is lifted up, the bladders become filled by the external air, which rushes in through the tube which communicates with both of them. When the handle is depressed, the air is expelled again. In the like manner the lungs are filled with air, and emptied again when the capacity of the chest is enlarged by the inspiratory muscles, and then diminished by the expiratory ones.

When emphysema arises from a wound, or ulceration of the pleura pulmonalis, on one side of the thorax, the case is nearly the same as if an opening were made in one of the bladders, which opening would form a communication, as the same gentleman observes, with the bellows and bladder on one side. If this should happen while the handle of the bellows is depressed, no sooner is the handle raised, than air rushes into the space betwixt the bladder and bellows, and on keeping up the handle a little while, the bladder will become quite collapsed, and the place which it occupied, while distended, will now be occupied by the air. If now, says Sir A. Halliday, "we attempt to force out the air, by depressing the handle of the bellows, we shall find that this cannot be done; for there is no direct communication between the bellows and the external air; and as the effused air presses equally on all parts of the collapsed bladder, it cannot escape through it."

When the thorax is expanded in inspiration, the pressure is taken off the surface of the wounded lung, and the air which now enters this organ, instead of distending its cells, passes through its wound into the space between the pleura pulmonalis, and pleura costalis. The lung will, indeed, be partially expanded, as long as inspiration on that side goes on; the more so, the smaller its wound is. At every expiration, however, when the thorax is diminished, the effused air will be compressed against the wounded lung; but none of the air which has escaped can re-enter the lung again; "because (as the preceding writer accurately remarks) the whole of the air contained in the lung, must be forced out, and then the pressure (of the air) against every part of the collapsed lung being equal, will prevent its separating any part, so as to make a passage for itself into the trachea." Thus fresh air accumulates at every inspiration in the space between the pleuræ, while none can escape from the same situation during expiration, and the quantity accumulated will, at last, equal that which is received into the other lung, during the most powerful inspiration.

When the pleura pulmonalis, and pleura costalis are both wounded, the same effusion of air between them continues from the above-mentioned causes, till the lung collapses. When an attempt is now made to expire, the injured side of the thorax must continue distended, notwithstanding every effort of the patient. In this expiratory act, however, if the capacity of the thorax be diminished, and the air compressed, a part of it finds its way through the wound in the pleura costalis, into the common cellular substance of the parietes of the chest.

The passage of air into the cavity of the thorax during the inspiration is, as Sir A. Halliday observes, now more easy than the return of that already effused in the cellular membrane, and consequently, the *subcutaneous emphysema* continues to increase with a rapidity which is remarkable, as long as the patient lives.

To explain the origin of emphysema, in cases of wounds, which only enter the chest, and do not injure the lungs at all, this writer has recourse to the simile of the bellows and bladders. Were an opening made into the bellows, without injuring the contained bladders, and the access of air by this opening more free than that by the nozzle, communicating with the cavity of the bladder, more air would enter by the opening, than by the pipe, on the handle being raised, so that the bladder would not rise as usual, when no opening in the side of the bellows existed. If the latter opening be smaller than that of the pipe, the bladder will only be partially filled, and on depressing the handle of the bellows, the air contained in the bladder, and that between the bladder and the bellows, will be expelled in the same proportion to each other, as that in which they were formerly filled. This process would continue to go on in the same way, did not the bladder naturally collapse more and more from its gravitation. Let us now stop the mouth of the pipe, while the handle of the bellows is raised, and the bladder partially filled. On trying next to depress the handle, it results, that as no air can escape from the pipe, the air contained between the bladder and the bellows must be first evacuated, while that contained in the bladder of the sound side, will be forced into the bladder on the injured side, and either distend it, so as to rupture it, or cause it to protrude.

Hence, in the case of a wound penetrating the chest, without injuring the lungs, if the air can enter more freely by the wound than by the trachea, more of it will enter, in the act of inspiration, into the cavity of the thorax, than into the lungs. On the contrary, when the opening of the wound is not so large as that of the trachea, less air will enter the thorax than the lungs.

In the expiration, the air will be forced from the two different situations, in proportion to the quantity which enters each of them in inspiration, and no air at all would accumulate in the thorax, did not the lungs always tend to collapse from their gravitation. Should, however, the patient, in making an effort to expire, contract the glottis, the air contained in the lungs of the sound side, may be propelled into the bronchia and air-cells of the lungs, on the same side as the wound, so as to distend them, and even make them protrude at the wound.

Dr. Halliday remarks, that such a protrusion often happens, when wounds are made in dogs, and has been erroneously adduced as an argument against the collapse of the lungs, when an opening is made into the thorax of the human subject. (See *Obs. on Emphysema, by Sir A. Halliday,* 1807.)

For information concerning the treatment of this affection, see *Emphysema.*

5. I have already noticed, that wounds of the thorax may injure one of the intercostal arteries, and when the blood cannot flow outward, it may be extravasated in the chest. The same consequence may follow wounds of the pulmonary vessels, those of the heart, or of the heart itself. And here I may take the opportunity of remarking, that sometimes wounds of the heart do not prove instantaneously fatal. A case in which a bayonet passed through the colon, stomach, diaphragm, part of the lungs, and the right ventricle of the heart, and yet the patient lived nine hours after the receipt of the injury, is recorded by Dr. Babbington. (See *Med. Records and Researches. Lond.* 1798; *also a case by Chastenet in Jour. de Méd. Mil. T.* 2.) In almost all cases, however, such injuries prove instantly fatal; and the same remark will extend to cases of hemorrhage from vessels above a certain size, but when they are less considerable, the patient may live for a greater or less time, and receive the aid of surgery.

The following are the symptoms which denote an extravasation of blood in the thorax. The patient feels great oppression, and such uneasiness as will not let him long continue in one position. Unless he bend his body very much forward, in which position, the diaphragm is relaxed, and not so much dragged by the weight of the extravasated fluid, he feels great difficulty in standing or sitting up. When the thighs are bent, the patient can lie with tolerable ease on his back; he is also not averse to lying on the side, on which the wound is situated; but he cannot place himself on the opposite side, without feeling very acute pain in the situation of the mediastinum.

His respiration is short, frequent, and interrupted by sighs; his veins become empty; a cadaverous paleness spreads over his countenance; his extremities become cold; a viscid perspiration covers his neck and temples; his teeth chatter; his pulse becomes weak; and if, as most frequently happens, the lungs are wounded, he spits up frothy blood, and air issues from the wound.

Though one might suppose the above class of symptoms always attendant on a considerable effusion of blood in the thorax, this is not the case. Wounded persons have been known to die of such an extravasation, whose respiration was tolerably free, and who did not complain of suffering more inconvenience in one posture than another. Sabatier says, that several facts of this kind have fallen under his own observation. Other wounded persons, also, who suffered most of the complaints ascribable to extravasations of blood in the thorax, have been cured by ordinary means. Mery gives an account of a young man, wounded in the anterior and superior part of the chest, about two o'clock in the morning, who had such difficulty of breathing, and fever, five hours afterward, that an extravasation was supposed to exist, and Mery was thinking of making an opening for its evacuation. A tumour near the great pectoral muscle, presenting neither the feel of fluctuation, nor that of emphysema, made him suspend his decision. The tumour was dispersed by bleeding, and the application of compresses, dipped in a mixture of spirit of wine and water.

However, even the assemblage of the above symptoms did not deceive Petit. Having been requested to assist at an operation, which was about to be done on a wounded man, about whose armpit, pectoralis major, and latissimus dorsi muscles a prodigious emphysematous swelling had taken place; whose respiration was painful and difficult; and who spit up frothy blood; Petit gave it as his opinion, that it was unnecessary to make an opening into the chest. He thought it would be sufficient to enlarge the wound, which was at a little distance from the armpit, near the edge of the latissimus dorsi, so as to give vent to the effused air. This advice was followed, the emphysema soon disappeared, and the patient recovered.

The equivocal nature of the symptoms of extravasations of blood in the thorax, has induced practitioners to pay the most scrupulous attention to every circumstance attendant on these cases. In several instances, Valentin remarked, that an ecchymosis occurred, at the angle of the false ribs, and spread towards the loins. The ecchymosis is described as being of a clear purple colour, like the spots which sometimes form on the abdomen, a little while after death. In a case, in which most of the symptoms of extravasation were combined with the above sort of ecchymosis, Valentin advised a counter-opening to be made. The advice was overruled, and the patient soon afterward died: more than six pints of blood were found extravasated in the thorax.

Sabatier remarks, that we cannot too highly applaud the zeal of those practitioners, who endeavour to dispel the doubts which still prevail in several parts of surgery. At the same time, he thinks, that all who take interest in the improvement of this science, should endeavour to ascertain the truth of any new observations which are offered. Hence, he deems it proper to relate a case which was communicated to him by M. Saucerotte (the father,) an eminent military surgeon, and which shows that the ecchymosis, observed by Valentin, is, at least, not invariably attendant on extravasations of blood in the chest. A light-horseman, who had received a thrust with a sabre in the right side of the thorax, above the tendon of the pectoralis major, appeared to be going on very well for the first four days after the accident. On the fifth, he complained of difficulty of breathing, uneasiness, and an inability of lying on the left side, without aggravating his complaints. He complained of a great deal of pain in the region of the liver, and at the top of the shoulder. His pulse was small and contracted, and rather hard than weak. The right side of the chest seemed larger than the left. On the eight and ninth day, the symptoms became more urgent, and the patient found no ease, except in leaning on his right side, and supporting himself on a chair, placed across his bed. This assemblage of symptoms indicated an extravasation of blood in the right cavity of the thorax; but as the ecchymosis, which Valentin has described, was not apparent, doubts were entertained about the real nature of the case. When a counter-opening was made on the dead body, a pint of putrid blood flowed out.

When the surgeon feels assured, that an extravasation of blood in the thorax has really occurred, and the symptoms are very urgent, the discharge of the confined fluid appears to promise benefit. However, before the operation is done, the revived state of the pulse, the return of warmth in the extremities, and the cessation of great faintness, ought to denote, that the hemorrhage no longer continues from the vessels; for, if this be not the case, a fresh quantity of blood must soon be extravasated again, and the patient die exhausted.

Authors mention five methods of discharging blood from the thorax; viz. 1st. By placing the patient in a posture, which favours the escape of the blood. 2dly. By introducing a syringe for the purpose of sucking it out, or a mere cannula, through which it is to flow. 3dly. By enlarging the wound. 4thly. By employing injections. 5thly. By making an opening in a depending part of the thorax.

1. Success cannot be expected from merely placing the patient in a posture, which is favourable to the escape of the extravasated blood, except when the wound is situated at the inferior part of the chest, and is large and direct in its course. Paré successfully adopted this method in the case of a soldier, who was stabbed in three places with a sword; one of the wounds, which entered the chest, being situated under the right nipple. The man was first

dressed by a surgeon, who made several sutures. The patient was soon afterward attacked with considerable difficulty of breathing, fever, coughing, spitting of blood, and acute pain in the side. Paré, who was consulted the next day, suspected that an extravasation had happened; consequently he cut out the sutures, and placed the patient in a position, in which his feet were much more raised than the head. Paré also recommended him to hold his breath, and then introduced his finger into the wound, in order to take away some clots of blood, which appeared at its orifice. By these steps, the discharge of seven or eight ounces of fetid coagulated blood was effected.

2. The idea of drawing out of the thorax extravasated blood with a syringe is rather ancient. The pipes of all syringes, for this purpose, should have blunt ends, lest they injure the lungs. Mere tubes, containing a stilet, have also frequently been employed. Scultetus relates a case, in which an instrument of the latter sort was successfully employed. No syringe, nor any suction with the mouth, was requisite. It was found necessary merely to introduce the tube, and then withdraw the stilet.

Lamotte used only a simple cannula, which he introduced into the centre of the extravasation. Then having placed the patient in what he conceived to be the most favourable posture, and requested him to hold his breath, he drew off the collection of fluid. The cases numbered 216, 217, 218, show the success which attended this method. Although it might also have answered very well in case 219, Lamotte saw that the high situation of the wound would not have allowed all the blood to be discharged, and therefore he made a counter-opening. Thus the thorax was completely emptied, and a recovery ensued. When a cannula is employed, authors recommend it to be introduced every day till the bad symptoms cease, and no more fluid escapes through the cavity of the instrument After having given vent to blood, it allows a bloody serous fluid to escape, and at a later period pus, which becomes of a thicker and thicker consistence, the nearer the patient is to a recovery.

3. The cases in which a wound, complicated with an extravasation in the chest, should be dilated, are those in which the situation of the opening is favourable to the escape of the blood. The operation is performed with a curved bistoury, and a director. The integuments, and external muscles, are to be divided in a perpendicular direction, and the intercostal muscles in a line parallel to the ribs. Care is also to be taken not to cut too near the lower edge of the upper rib, lest the intercostal artery be wounded. Dionis practised such an operation on a soldier, who was wounded at Béfort, in 1703, with a sword below the right nipple, whereby a direct opening was made into the thorax. When the extravasated fluid had been let out, Dionis made the patient lie on the wounded side during the night, and in proportion as the blood continued to be thus evacuated, the breathing became free from oppression.

4. The methods, above explained, may be of use when the blood retains its natural state of fluidity; but, when it is coagulated, as often happens, they can be of no avail. In this circumstance, most authors direct a proper opening to be made, and tepid water then to be thrown into the chest, with the view of loosening and dissolving the coagula, and washing them out of the wound. The French writers, even the modern ones, (*Sabatier*) most absurdly recommend the injection of various detergent vulnerary decoctions, and of solutions of honey of roses, soap, salt, &c. What idea these authors can entertain of the great tendency to inflammation of the lungs and pleura, or what good they can expect from such applications, is difficult of conception. I am firmly convinced, that the meanest scribbler on surgery, in this country, would be ashamed of offering such advice.

5. When the wound is narrow, and situated at the upper part of the chest, the extravasated blood cannot be discharged, unless a counter-opening be made at the lower part of this cavity. The best place for making the opening, and the proper manner of executing the operation, are described under the head of *Paracentesis.* As soon as the opening has been made, the blood flows out. Its discharge is then to be promoted by such a posture as will render the opening depending.

The old surgeons, who had much more fear than the moderns of letting the opening heal up, sometimes employed tents for the purpose of preventing this event, until all danger of another collection of blood or matter seemed to be over. However, as in these cases tents are apt to bring on inflammation of the pleura and lungs, hinder the escape of whatever fluid is contained in the chest, and cause great irritation, pain, and even exfoliations from the ribs, their use is now relinquished.

As large tents had the effect of hindering the discharge of blood or matter from the cavity of the chest, some of the old French surgeons employed a kind of wick; but, in the present state of surgery, I do not consider that it would be at all edifying to enter into a comparison of these contrivances. If any means be ever requisite for keeping the opening from closing, there cannot be a better thing for the purpose than a short cannula, with a rim to keep it from slipping into the thorax, and two little rings for confining it in its situation with a riband. This should only just enter deeply enough to have its inner orifice on a level, or a very little further inward than the pleura costalis, so that it may not irritate the lungs.

When the patient has been dressed, he is to be kept in bed, with his head and chest somewhat elevated, and his thighs bent, in which position the breathing will be least oppressed. It is usual also to recommend him to lie, as much as possible, on the side on which the operation has been done. He is to keep himself in as quiet a condition as he can. He is to be put on very low diet, and, if his strength allows, he is to be bled from the arm; and this evacuation must be repeated, with other antiphlogistic means, as often as the urgency of the fever and inflammatory symptoms indicates, and the strength allows. Bleeding from the arm, besides counter-acting inflammation in the chest, which is a principal source of danger, does good by lessening the force of the circulation in the wounded vessels, and thus diminishing the tendency to internal hemorrhage.

The old practice of keeping open wounds of the chest is now nearly exploded; but, if it ever be adviseable, particular caution must be used not to let the tents, and pieces of the dressings, glide into the cavity of the pleura. Tulpius speaks of a Danish gentleman who had been under a careless surgeon, on account of a wound in the thorax, and who coughed up, six months afterward, a large tent. A similar fact is recorded by Hildanus. A man was stabbed in the right side of the chest, near the axilla, between the second and third ribs. For a fortnight, a great deal of blood was discharged both from the wound and the mouth. The wound healed; but the patient continued to be afflicted with considerable difficulty of breathing, an incessant cough, and to spit up a greenish, fetid matter. Three months afterward he coughed up two tents, which had slipped into the cavity of the thorax.

A relaxation of the antiphlogistic regimen must be made with very great circumspection. Too much nourishment, talking too frequently, and any exertion, are circumstances which may induce a renewal of the hemorrhage, and extravasation. Vesalius saw an accident of this nature happen a fortnight after the wound, and eleven days after the operation for empyema. A soldier, who had been stabbed in two places with a sword above the right nipple, was attacked with fever, difficulty of breathing, restlessness, and acute pain at the bottom of the chest. These symptoms induced Vesalius to infer, that an extravasation had taken place; but he was afraid of making an opening in the chest for fear the hemorrhage should still continue from the wounded vessels. However, as the patient remained in the same state the fourth day after the receipt of the wounds, and he still had strength enough, Vesalius undertook the operation, by which a considerable quantity of extravasated blood was discharged. The patient felt great relief at the instant. The oozing of blood continued for a few days, after which a favourable suppuration took place in all the three wounds, and the case was expected to end well. But the patient having regained his strength, and taken too much food, the recurrence of hemorrhage caused his death. Lombard saw a soldier die instantaneously of internal hemorrhage, brought on by throwing a bowl at some nine pins, two months after he had been cured of a wound of the lungs.

When the edges of a penetrating wound of the chest are to be brought together, writers state, that the patient should be requested to make a strong inspiration, with the wound closed, and then a long, slow expiration with it open, and so on, till as much of the air is discharged from the thorax as possible, and then the wound is to be accurately closed with sticking-plaster. From what has been observed, however, in the article *Emphysema*, it will appear, that when there is a direct opening into the thorax, so as to admit the external air, the lungs on one side collapse, and remain so till the wound is healed, and the air absorbed. When one of these organs is wounded, a collapsed state is indeed the best condition in which it can possibly be for a certain time, that is, till the breach of continuity in it is healed. Schemes for making the lung expand, by exhausting the air from the cavity of the pleura, may be amusing on paper, but, I apprehend, they will never be of real use in practice.

Fistulæ sometimes continue a long while after wounds of the thorax. Platner mentions an instance in which there was a fistulous opening, out of which the air rushed with sufficient force to blow out a candle. The patient lived a long while in this state without suffering any particular inconvenience.

Another occasional consequence of a wound of the chest, is a hernia of the lungs, an affection of which Sabatier met with an example. A soldier, thirty years of age, was wounded with a bayonet in the right side of the chest, between the middle part of the fifth and sixth true ribs. The wound healed; but, as the intercostal muscles had been divided to a great extent, and could not be approximated with precision, an empty space was left under the integuments, which allowed a piece of the lungs, as large as a walnut, to protrude between the ribs. The swelling enlarged at the time of inspiration, and grew smaller when expiration took place, occasioning merely a slight pain without any oppression in the chest.

Though so much has been written on the subject of discharging blood from the chest, in cases of extravasation within that cavity, the operation is very rare. During the last twenty-four years, I have never heard of its being done by any of the surgeons in London. In military surgery, however, the practice is occasionally exemplified. (*Larrey, Mém. de Chir. Mil. T.* 2, *p.* 158, *&c.*) No doubt, the true reason of the operation being uncommon, is the obscurity in the diagnosis, the symptoms being all of an equivocal nature. Even Larrey, generally so partial to operations, recommends the immediate closure of all wounds of the chest, excepting such as are complicated with injury of the intercostal artery, because, (says he) unless very considerable vessels of the lungs are injured, (in which case nothing can be of any use) either no extravasation, or only a trivial one, happens, which, under the employment of rigorous antiphlogistic treatment, may be dispersed by absorption. (*P.* 127.) In the general propriety of closing all wounds of the chest, I entirely concur with Larrey, Pelletan, Boyer, and Dr. Hennen. (*On Military Surgery, ed.* 2, *p.* 373.)

Consult *Sabatier, De la Médecine Operatoire, T.* 2. *Journ. de Méd. Militaire,* 7 *Tomes. Schmucker, Wahrnehmungen,* 2 *B. Berlin,* 1774—89. *J. Bell, on the Nature and Cure of Wounds, Ed.* 3. *D. J. Larrey, Mém. de Chir. Militaire,* 8*vo. Paris,* 1812—1817, *in various places. John Hennen, Principles of Military Surgery, Ed.* 2, 8*vo. Edinb.* 1820. *Wm. Maiden, an Account of a Case of Recovery, after an extraordinary Accident,* 4*to. Lond.* 1812. *The injury here referred to is one of the most extraordinary on record; the shaft of a gig having been driven with the greatest violence between the sternum and lungs. Sir A. Halliday, in Edinb. Med. and Surg. Journ. Vol.* 11, *p.* 140; *a Recovery from a Gunshot Injury, in which a great part of the Shoulder was carried away, and the Lungs and Pericardium were exposed: to the authenticity of this Case I can bear witness myself, having been at the Field Hospital, when the Soldier arrived from the Trenches, near Antwerp.*

Wounds of the Abdomen.—Here one of the chief causes of danger is the tendency of the peritoneum to inflame. Every penetrating wound of the belly is apt to excite this inflammation, which too often extends itself over all the viscera, and terminates in the death of the patient.

There are (says Mr. John Bell) a thousand occasions, on which the delicacy of the peritoneum may be observed. The wound of the small sword, and the stab of the stiletto, explain to us, how quickly the peritoneum, and all its contained bowels, inflame from the most minute wound, although the injury be almost too small to be visible on the outside, and scarcely within; for often, upon dissection, no intestines are discovered wounded, and no feces have escaped into the abdomen. In subjects who die after lithotomy, we find the cavity of the peritoneum universally inflamed. The operation of the Cæsarean section is fatal, not from any loss of blood, for there is little bleeding; nor from the parts being exposed to the air, for patients also die in whom the womb bursts, and where the air has no possible opportunity of insinuating itself; but the case proves fatal from the inflammation which is always disposed to originate from wounds of the peritoneum, small as well as great. (*Discourses on the Nature and Cure of Wounds, p.* 310, *edit.* 3.)

But although there can be no doubt that the wound, abstractedly considered, is the most frequent occasion of this dreaded inflammation; yet it sometimes happens that the inflammatory consequences must be ascribed to another kind of cause. If an intestine be wounded, its contents may, under certain circumstances, be effused in the abdomen; if the liver, spleen, kidney, or any large vessel be injured, blood may be poured out among the viscera; if the gall-bladder be wounded, bile may be effused; and if the bladder be pierced, the urine may escape into the abdomen. Now all these fluids are extraneous substances with respect to the surfaces, with which they often come into contact, and, as such, they give rise to inflammation of the peritoneum and viscera.

Wounds of the belly are divided, by almost all writers, into such as penetrate the cavity of the abdomen, and into others, which only interest the skin and muscles.

The former differ very much in their nature, and degree of danger, according as they do, or do not, injure parts of importance, contained in the peritoneum. The latter are not remarkably different from the generality of other superficial wounds. The chief indications are to lower inflammation, and to prevent collections of matter. A few particularities, however, in the treatment of superficial wounds of the abdomen, merit attention.

Superficial Wounds.—The most ancient surgeons, and their successors, down to the present day, have recorded, that wounds of tendinous parts frequently give rise to very unpleasant consequences. Almost the whole front of the abdomen is covered with tendinous expansions, and, on this account, it is not unusual to see punctured wounds in this situation followed by extensive inflammation, and the formation of abscesses. At the same time, the patient is affected with a great deal of inflammatory fever. He suffers acute pain, sickness, hiccough, and considerable disturbance of the nervous system. (*Callisen, Syst. Chirurg. Hodiernæ, Vol.* 1, *p.* 698, *Hafniæ,* 1798.) When the tension and swelling of the abdomen abate, shiverings sometimes occur, and indicate the occurrence of suppuration. The matter sometimes accumulates in the tendinous sheath of the rectus muscle, and, when the collection in this situation remains undiscovered until a pointing appears, no sooner does the abscess burst, or it is opened, than an extraordinary quantity of matter is discharged. The surgeon should carefully remember the nature of this kind of case, as there is frequently not sufficient alteration in the appearance of the integuments to denote either the existence or the extent of the suppuration.

Such an abscess forms one remarkable exception to the excellent general rule of allowing acute phlegmonous abscesses to burst of their own accord. In the present instance, there is an aponeurotic expansion, intervening between the abscess and the skin, and nothing retards the natural progress of the matter to the surface of the body so powerfully as the interposition of a tendinous fascia. But, even in this circumstance, the propensity of pus to make its way outward is often seen to have immense influence. Though there is only a thin membrane (viz. the peritoneum) between matter so situated, and the cavity of the abdomen, the abscess after a time mostly points externally.

The proper treatment of this case is to prevent the surprising accumulation of matter, and rapid increase of mischief, by making a depending opening, sometimes at the very lowest part of the sheath of the rectus muscle, and this, as soon as the lodgement of matter is clearly ascertained.

If ever there be a case in which it is advantageous and justifiable to make an early dilatation of a punctured wound, in order to prevent the above-described ill consequences, it is unquestionably the present one. Such practice, indeed, is particularly recommended by Callisen, in addition to the strictest antiphlogistic means. (See *Syst. Chir. Hodiernæ, Vol.* 1, *p.* 698, *edit.* 1798.)

Sometimes the matter is formed between the external and internal oblique muscles, and spreads to a great extent. The pus may even insinuate itself into the abdomen, and the case end fatally. Such an example is recorded by Dr. Crowther, of Wakefield. In this instance, however, the disease proceeded from a contusion, not a wound. (See *Edinb. Med. and Surgical Journal, Vol.* 2, *p.* 129.)

Superficial wounds of the abdomen are to be treated on the same principles as similar wounds in other situations. The indications are to prevent inflammation as much as possible, and, if suppuration should be inevitable, to let out the matter by a depending opening as soon as the abscess is known to exist. The inflammation is to be checked by general and topical bleeding, low diet, emollient clysters, diluent beverages, quietude, opening medicines, cold applications, or fomentations and poultices, and the mildest and most simple dressings. (See *Inflammation.*)

Whenever the abdominal muscles are wounded, they should be relaxed, and the patient kept quiet in bed. A very important point in the treatment of wounds of the parietes of the abdomen, is to afford a degree of support to the wounded parts, so that the pressure of the viscera may be resisted. The sides of the abdomen are almost wholly composed of soft parts, which easily yield. No part of the front, or sides of the abdomen, is supported by a bony structure, and as the viscera are for the most part, more or less moveable, and closely compressed by the abdominal muscles, and diaphragm, they are liable to protrude, whenever the resistance of the containing parts is not sufficiently powerful. Hence all wounds of the abdomen, especially those, in which both the integuments and muscles have been cut, demand strict attention to the precaution of supporting the wounded part, and this, though the peritoneum itself should not happen to be divided. The patient ought to keep as much as possible in a horizontal position, and suitable compresses and bandages should be applied. And, in order to guard against herniæ, the parts should be supported, in this way, a considerable time after the wound is healed.

The peritoneum being connected by means of cellular substance with the inner surface of the abdominal muscles, there is always some risk of the inflammation of these parts extending to that membrane. The danger must be averted by the rigorous employment of antiphlogistic treatment. What renders the event still more dangerous, is, that when one point of the peritoneum is affected, the inflammation usually spreads with immense rapidity over its whole extent, and too often proves fatal.

As superficial wounds of the abdomen are to be treated on the general principles, applicable to all resembling wounds in other situations, it is hardly necessary to state, that union by the first intention, if possible, is always to be attempted.

Of Wounds penetrating the Cavity of the Abdomen—The first thing which the surgeon is generally anxious to know, when he is called to a wound of the belly is, whether the wound penetrates the cavity of the abdomen, and whether any of the viscera are injured.

When the wound is extensive, and the bowels protrude, the first part of the question is at once decided. But when the wound is narrow, and the viscera do not protrude, it is more difficult to know, whether the cavity of the abdomen is penetrated or not. An opinion, however, may be formed, by carefully examining the wound with a finger or a probe; by observing, if possible, how much of the weapon is stained with blood; considering the direction in which it was pushed; the quantity of blood lost, the state of the pulse, and whether any bile, feces, or other fluids, known to be naturally contained in some of the abdominal viscera, have been discharged from the orifice of the injury.

When the wound is sufficiently large to admit the finger, a surgeon can always learn, whether the injury extends into the abdomen, because the smooth lining of that cavity, and the contained bowels, may be easily felt. There is one chance of deception, however, arising from the possibility of mistaking the inside of the sheath of the rectus muscle for the cavity of the peritoneum; and when the examination is made with a probe, particular caution should be used in forming a judgment of the nature of the case; for the parts are so soft and yielding, that a very little force will make the instrument pass a considerable way inward. Every examination of this kind should always be undertaken, if possible, when the patient is exactly in the same position, in which he was at the time of receiving the wound. Formerly, injections were sometimes employed as tests of the penetration of the cavity of the abdomen. This absurd experiment is now very rightly exploded. It is well known to the moderns, that the space, termed the cavity of the abdomen, is, in fact, completely filled with the various viscera, and that in general, an injected fluid would not so easily find its way into the bag of the peritoneum, as an unreflecting person might suppose. And if it were propelled with much force, it would be quite as likely to insinuate itself into the cellular substance of the parietes of the abdomen, or perhaps, into the sheath of the rectus muscle. The least tortuosity of the wound, or a piece of bowel, or omentum, lying against the internal orifice of the injury, would also completely prevent an injection from passing into the abdomen.

When a considerable quantity of blood issues from a wound of the abdomen, we may pronounce, almost with certainty, that some large vessel, within its cavity, is injured. Excepting the epigastric artery, which runs on the forepart of the abdomen, along the inner surface of the rectus muscle, no large vessel is distributed to the muscles and integuments. At the same time, it is deserving of particular notice, that a large artery may be opened in the abdomen, and not a drop of blood be discharged from the wound.

In such cases, the consequent symptoms quickly lead to a suspicion of what has happened. The patient complains of extreme debility and faintness; his pulse falters; he has cold sweats; and if the bleeding should not speedily cease, these symptoms are soon followed by death.

Sometimes, the extension of the wound into the cavity of the abdomen, is from the first quite manifest, being indicated by the escape of chyle, bilious matter, feces, or other fluids. The vomiting up of a considerable quantity of blood, or its discharge by stool, affords also the same information. The urine however, may flow from a wound, which does not actually penetrate the abdomen, for the kidneys, ureter, and bladder may be said to be out of the abdomen, because they are really on the outside of the cavity of the peritoneum.

When none of the above symptoms occur; when neither the finger nor probe can be introduced; when none of the fluids, known to be contained in the various receptacles in the abdomen, are discharged from the wound; when the pulse remains natural, and the pain is not excessive; there is reason to hope, that the wound has not injured parts of greater consequence, than the integuments and muscles. (*Encyclopédie Méthodique, Partie Chir. Art. Abdomen.*)

I have now taken a survey of the criteria, commonly noticed by writers, for the purpose of enabling surgeons to discriminate a wound, which penetrates the abdomen, from one which is more superficial. My next duty is to warn the practitioner, that too much solicitude to determine this point, is very frequently productive of serious harm. It may be set down, as an axiom in surgery, that *in general, whenever the probing of a wound is not rendered absolutely necessary by some particular object in view, it may be judiciously omitted.* A narrow, oblique wound may enter the cavity of the abdomen, without there being any particular method of ascertaining, whether it has done so, or not. However, this want of positive information is of no practical importance; for, when there are no urgent symptoms, evincing the nature of the case, the treatment ought obviously to resemble that of a simple wound; and whether the wound be deep, or superficial, antiphlogistic remedies are indicated.

The edges of a wound, penetrating the abdomen, but unattended with injury of the viscera, are to be brought together with sticking-plaster, in the same way as common wounds. Sutures are not generally necessary. Numerous cases may be found in the records of surgery, proving that wounds of the abdomen may be easily united without sutures, provided the surgeon take care to avail himself of the assistance, which may be derived from a suitable position and a proper bandage. But such cases are less decisive, than relations of the Cæsarean operation, the extensive wound of which admits of being healed by the same simple means. It is not my intention to assert, that in the majority of these examples, sutures were altogether dispensed with; but, the ligatures frequently cut their way through the skin and muscles, and the application of others was impossible, either on account of the particular state of the case, or the patient's aversion to them. Still the union of such wounds was accomplished. A bandage, made on the same plan, as that with eighteen tails, would be extremely convenient for longitudinal wounds of the abdomen. (See *Pibrac in Mém. de l'Acad. de Chir. T.* 3, 4*to.*)

In the treatment of wounds of the abdomen, sutures may generally be relinquished, not only without harm, but with benefit; for their employment is sometimes the cause of bad symptoms. In one instance, the hiccough and vomiting could not be appeased by any remedy which was tried. On the fourth day, the wound was inflamed and painful, and it was judged proper to cut away two sutures, and employ only simple dressings, with the view of diminishing the pain and swelling. The symptoms quickly abated, and in a week, were entirely cured, the wound healing up very well. (*Op. cit.*)

However, there are circumstances, in which it would be impossible to dispense with sutures. If, for instance, the belly were torn open from one side to the other with a bullock's horn; or if it were extensively divided with the tusks of a wild boar, a stag's horn, a razor, &c. and the inflated intestine could not be kept from protruding; some stitches would be absolutely necessary, but even then, they should be as few as possible. (*Sabatier, Médecine Opératoire, T.* 1, *p.* 214, *edit.* 2.)

"Our good old surgeon Wiseman (observes Mr. John Bell) has said with great simplicity, as a great many have said after him, 'it frequently happeneth, that a sword passeth through the body, without wounding any considerable part.' He means, that a rapier, or ball, often passes quite across the belly, in at the navel, and out at the back, and that without one bad sign, the patient recovers, and as has very often happened, walks abroad in good health, in eight days; which speedy cure has been supposed to imply a simple wound, in which all the bowels have escaped. But we see now, *how* this is to be explained; for we know, that in a thrust across the abdomen, six turns of intestine may be wounded,—each wound may adhere; adhesion, we know, is begun in a few hours, and is perfected in a few days; and when it is perfect, all danger of inflammation is over; and when the danger of inflammation is over, the patient may walk abroad; so that we may do, just as old Wiseman did in the case here alluded to, (*P.* 98, the case of a man, who was wounded across the belly, and well and abroad in seven days,) 'Bleed him, and advise him to keep his bed and be quiet.' In short, a man, thus wounded, if he be kept low, has his chance of escaping by an adhesion of the internal wounds." (*Discourses on the Nature and Cure of Wounds, p.* 329, 330, *edit.* 3.)

The truth of these observations is well illustrated in a case mentioned by Dr. Hennen, in which a soldier recovered, whose abdomen was pierced with a ramrod, which stuck so fast in the vertebræ, that some force was required to disengage it. (*On Military Surgery, p.* 402, *ed.* 2.)

When a man is stabbed or shot in the belly, and none of the bowels protrude, the wisest plan is to keep the patient as quiet as possible, have recourse to copious and repeated bleeding, prescribe anodynes, and the lowest fluid diet, and apply light superficial unirritating dressings. In the event of severe pain and swelling of the belly coming on, leeches, fomentations, the warm bath, and emollient poultices, will be necessary, and nothing will now avail, except the most rigorous employment of antiphlogistic remedies. As Dr. Hennen observes, the best means of emptying the bowels are oleaginous clysters, and if any internal medicine be given, as a purgative, it should be of the mildest nature. (*On Military Surgery, p.* 402, *ed.* 2.) Castor oil is perhaps the best; but, on the whole, for some few days, I would hardly venture beyond the use of clysters for procuring evacuations from the bowels.

Suppuration in the Abdomen, in consequence of Wounds.—Abscesses within the bag of the peritoneum are far from being common. As a late writer well observes, "the containing and contained parts of the abdomen present to each other an uniform and continuous surface of membrane. This membrane is of the serous class, and the species of inflammation, to which it is especially subject, is that, which has been denominated the adhesive. The membrane, lining the intestinal canal, is of the mucous class, and the ulcerative inflammation is the species, to which this class is liable. This beneficent provision is an irresistible evidence of the operation of a salutary principle in disease. If the inflamed peritoneum had run directly into suppuration; ulceration of the surrounding parts would have been required for an outlet; and if the internal surface of the irritated bowel had tended to form adhesions, the canal would have been in constant danger of obliteration." (*Travers on Injuries of the Intestines, &c. p.* 10.)

That collections of matter, however, do sometimes take place in the cavity of the abdomen, in consequence of wounds, is a fact, of which there are too many proofs on record for the possibility of the case to be doubted. At this moment, be it sufficient to refer to two examples of the occurrence, as related by Mr. B. Bell. (*System of Surgery, Vol.* 5, *p.* 256.)

If the abscess were in any other part of the body, and did not readily point, the wisest practice would undoubtedly be to make an opening sufficient for the evacuation of the matter. But suppuration in the abdomen can seldom be known with certainty in an early stage of the case: for the abscess is so deep, that no fluctuation, nor swelling, is perceptible, until the quantity of pus is considerable. Nor would it be judicious to expose the patient to the hazard, which might arise from making an opening into the abdomen, merely for the sake of discharging a small quantity of matter.

Many writers impute much of the danger of wounds of the abdomen to the entrance of air into the cavity of the peritoneum. In inculcating such opinions, however, they betray an inaccuracy of observation, which a very little reflection would have set right. Too much stress has long been laid on the introduction of air into the abdomen, as being a cause of inflammation. The fact is, the cavity of the belly is always so completely occupied by the several viscera, that the whole inner surface of the peritoneum is invariably in close contact with them, and therefore, air cannot easily diffuse itself from the wound, throughout the abdomen. After tapping, in dropsical cases, inflammation seldom arises, though here the air has quite as good an opportunity of entering the abdomen, as in any case of wound. The peritoneum in animals has been inflated, without any inflammation being excited. In cases of tympanitis, the peritoneum is distended with air, and yet both this membrane and the bowels are quite uninflamed. In the human subject, it seems probable, that if a wound were made in a vacuum, the breach of continuity itself would be an adequate cause of inflammation. It may also be remarked, that collections of matter in the abdomen are almost always completely circumscribed, and separated from the general cavity of the peritoneum, by the adhesion of the viscera to each other, and to the inside of the peritoneum.

I am of opinion, that no surgical writer has succeeded so well, as Mr. John Bell, in exposing the absurd apprehensions, not uncommonly entertained by practitioners, respecting the entrance of air into the abdomen and other cavities of the body. He inquires, 1st. Whether air can really get into the cavity of the abdomen? and, 2dly.

Whether, if it were there, it would produce the dreadful effects ascribed to it?

Upon the first question, his arguments run thus:—"Suppose a wound of an inch in length:—suppose the bowel to have sunk, in some strange way, into the pelvis, for example, so as to have left a mere vacuum; what should happen with the flexible parietes of the abdomen? Should they stand rigid, while the air rushed into the cavity to fill it? No, surely. But, on the contrary, the walls of the abdomen would fall together, and the pressure of the outward air, far from making the air rush in by the outward wound, would, at once, lay the belly flat, and close the wound. But, since the walls of the abdomen are not flaccid, nor the cavity empty, but the abdomen full, and the flat muscles, which cover it, acting strongly, the effect must be much more particular; for, the moment that the belly is wounded, the action of the muscles would force out part of the bowels; the continuance of that action is necessary to respiration: the respiration continues as regular after the wound as before; and the continual pressure of the abdominal muscles, and the diaphragm, against all the viscera of the abdomen, prevents the access of air so effectually, that though we should hold such a wound open with our fingers, no air could pass into the abdomen, further than to that piece of gut which is first touched with the finger, when we thrust it into the abdomen. Nothing is absolutely exposed to the air, except that piece of intestine which is without the abdomen, or that, which we see, when we expose a small piece of the bowels, by holding aside the lips of the wound. The pressing forward of that piece, and the protrusion of a portion of the gut, proportioned always to the size of the wound; the pressure from behind keeping that piece protruded, so that it is with difficulty we can push it back with our finger; this incessant pressure, in all directions, is an absolute security against the access of air. The intestine comes out, not like water out of a bottle, the place of which must be supplied by air entering into the bottle, in proportion as the water comes out; but, the gut is pushed down by the action of the muscular walls of the abdomen, and that action follows the intestine, and keeps it down, and prevents all access of the air, whether the gut continue thus protruding, or whether it be reduced; for, if it be reduced, the walls of the abdomen yield, allowing it to be thrust back, but admitting no air. Those, who want to know the effect of air, diffused within the cavity of the abdomen, must make other experiments, than merely cutting open pigs' bellies;—they must give us a fair case, without this unnecessary wound. We will not allow them to say, when they cut open the belly of any creature, with a long incision, that the inflammation arises from the air; much less shall we allow them to say, when they open the belly with a smaller incision, that, by that little incision, the air gets into the abdomen, and that all the bowels are exposed to the air." (*Discourses on the Nature of Wounds, p.* 343, 344.)

In adverting to the question, whether air is so irritating to the cavities of the body as many have supposed, Mr. John Bell criticises with much spirit and success, the opinions, published on this subject by Mr. A. Monro, in his account of the Bursæ Mucosæ, as the annexed quotations will show. "That the vulgar should believe, the first superficial impression that strikes them, of air hurting a wound or sore, is by no means surprising; but it is not natural that men, bred to philosophy, should allow so strange an assertion as this, without some kind of proof. That the air which we breathe, and which we feel upon the surface so bland and delightful, should have so opposite a relation to the internal parts, that it should there be a stimulus, more acrid and more dangerous than the urine, is not to be believed upon slight grounds. I do affirm (says Mr. John Bell) that it remains to be proved, that this fluid, which seems so bland and pleasant to all our senses, and to the outward surface, is yet a horrible stimulus when admitted, as a celebrated author grandly expresses it, 'into the deep recesses of our body.'"—(*Monro's Bursæ Mucosæ.*)

With how much reason Mr. John Bell objects, that this doctrine is unfounded, will be manifest to every man of any discernment, or impartiality.

"The air, for instance, escapes from the lungs, in a fractured rib, and first goes abroad into the thorax; then into the cellular substance; then the emphysematous tumour appears; but often without any scarifications, with very little care and assistance on our part, the air is absorbed, the tumour disappears, and, without inflammation of the chest or any particular danger, the man gets well. Here then is the air, within the cavity of a shut sac, filling the thorax, and oppressing the lungs, without any dangerous inflammation ensuing.

"That the air may be pushed under the cellular substance all over the body, without causing inflammation, is very plain, from the more desperate cases of emphysema, where the patients, after living eight or ten days, have died, not from inflammation, but from oppression merely, the body being so crammed with air, that even the eyeballs have, upon dissection, been found as tense as blown bladders. We have also many ludicrous cases of this kind, which prove this to our perfect satisfaction. Soldiers and sailors sometimes touch the scrotum with a lancet, introduce a blowpipe, and blow it up to an enormous size, imitating herniæ, by which they hope to escape from the service. The old story of a man, who was so wicked as to make a hole in his child's head, and blow it up, that he might show the child in the streets of Paris for a monster, is well authenticated; and I have little doubt, that a fellow who knew how to do this, would blow it up every morning, and squeeze it out when he put the child to bed at night. Some villanous butchers, having a grudge at a soldier, found him lying drunk under a hedge; they made a little hole in his neck, and blew it up, till he was like a bladder, or, as Dr. Hunter describes the disease of emphysema, *like a stuffed skin.*" (*P.* 388, 389.)

After many other pertinent observations, blended with appropriate satire on the extravagant notions professed by Monro, on the bad effects of the air in lithotomy, operations for hernia and hydrocele, the Cæsarian section, &c. Mr. John Bell most justly holds up to ridicule the propositions of Dr. Aitken, *to perform this last operation under the cover of a warm bath, in order to exclude the air.* "This, though it may seem to be a scurvy piece of wit, was really proposed in sober serious earnest. But (adds Mr. John Bell) the admission of atmospheric air, as a stimulus, when compared with the great incisions of lithotomy, of hernia, of hydrocele, of Cæsarean section, of the trepan, is no more than the drop of the bucket to the waters of the ocean. And it is just as poor logic to say, that after such desperate operations, these cavities are inflamed by the admission of air, as it would be to say, (as Monro did) that when a man is run through the pericardium with a red-hot poker, that the heart and pericardium are inflamed by the admission of the air." (*P.* 847, *Edit.* 3.)

Enough, I conceive, has been said, to dispel all the idle fear and prejudices, which have prevailed concerning the bad effects of the air in wounds of the abdomen, as well as several other cases. When so justly eminent a man as Dr. Alexander Monro, senior, was disturbed by such apprehensions, it is not wonderful that many a poor ordinary member of the profession should have been terrified nearly out of his wits upon the subject; and for quieting this alarm, and exposing its absurdities, I really think Mr. John Bell deserving particular praise.

In general, in all cases of wounds of the abdomen, it is an excellent rule never to be officious about abscesses which may take place, nor to exhibit a partiality to such experiments as have been devised for learning precisely what bowel is wounded. It is quite time enough to interfere, when the urgency of the symptoms confirm any suspicions which may be entertained. A great deal of harm is frequently done by handling and disturbing the wounded parts more than is necessary, and it is well known that wounds, at first attended with alarming symptoms, frequently have a favourable termination. Swords, balls, and other weapons, sometimes pass completely through the body, without the patient suffering afterward any threatening symptom, or, indeed, any effects which, abstractedly considered, would authorize the inference, that the viscera had been at all injured. Severe inflammations may not end in suppuration, and when pus is formed, it is sometimes absorbed again. Nothing then indicates the necessity for the discharge of purulent matter in the abdomen, unless the fluctuation and situation of the abscess be very distinct, and the quantity and pressure of the matter clearly productive of inconveniences. Under these circumstances, the surgeon should make a cautious puncture with a lancet.

Protrusion of the Viscera.—The omentum and small intestines are the parts most liable to protrusion; but, in large wounds, the great intestines, the stomach, and even the liver and spleen, may project through the opening. The *general* symptoms, indicating a protrusion of the parts, are sufficiently obvious; but, it deserves attention, that, in fat subjects, the adipose membrane may project from the wound, and put on somewhat of the appearance of omentum. The *special* symptoms are to be collected from a knowledge of the natural situation of the parts, and reflecting what region of the abdomen is wounded. (*Callisen, Syst. Chir. Hodiernæ, T.* 1, *p.* 702 *and* 703, *edit.* 1798.)

From penetrating wounds considerable portions of the bowels, or omentum, sometimes protrude, and though these viscera may not have received injury, yet their being displaced, is sometimes productive of fatal consequences.

The best mode of preventing such mischief, is to return the viscera into the cavity of the abdomen as speedily as possible. Almost all authors recommend fomenting the displaced parts, previously to the attempt at reduction; but in giving this advice, they seem to forget, that while time is lost in this preparatory measure, the protruded bowels suffer much more harm from exposure, that is to say, from the very circumstance of their being out of their natural situation, than they can possibly receive good from any application made to them. No kind of fomentation can be half so beneficial, as the natural warmth and moisture of the cavity of the abdomen. In order to facilitate the return of a protruded piece of intestine, or omentum, the abdominal muscles should be relaxed by placing the patient in a suitable posture, and the large intestines, emptied with a glyster. In mentioning the last measure, it is not meant, that the surgeon should delay the attempt to reduce the part, until the glyster has operated. No, this means is only enumerated as one that may become serviceable, in case the surgeon cannot immediately accomplish the object in view.—The mesentery ought always to be reduced before the intestine; the intestine before the omentum; but, the last protruded portion of each of these parts ought to be the first reduced.

It is only when the intestine and omentum are free from gangrene and mortification, that they are invariably to be returned into the cavity of the belly, without hesitation. Also, when the protruded parts are covered with sand, dust, or other extraneous matter, they should be tenderly washed with a little tepid water.

For the reduction of the parts, the forefingers are the most convenient; and it is a rule to keep the portion first returned, from protruding again, by one finger, until it has been followed by another portion, introduced by the other finger. The second piece is to be kept up, in the same way, by the finger used to return it; and so on, till the displaced parts have all been put into their natural situation.

In attempting to reduce a piece of protruded intestine, the patient should be placed in the most favourable posture: the head and chest should be elevated, and the pelvis raised with pillows. Nothing can be more absurd, than the advice to put the thorax rather lower than the pelvis, in order that the weight of the viscera may tend to draw inward the protruded parts. This is another erroneous idea, arising from the ridiculous supposition, that a great part of the abdomen is actually an empty cavity. The relaxation of the abdominal muscles is a much more rational and useful object. When this is properly attended to, and the above directions observed, and the wound is not exceedingly small, in relation to the bulk of the protruded viscera, the parts may generally be reduced. But in addition to what has been already stated, it is necessary to remark, that the pressure should be made in a straight direction into the abdomen; for when made obliquely, towards the edges of the wound, the parts are liable to suffer contusion, without being reduced, and even to glide between the layers of the abdominal muscles, and become strangulated. When the wound is in the front of the abdomen, pressure made in this unskilful way may force the viscera into the sheath of the rectus muscle, and cause the same perilous symptoms as arise from an incarcerated hernia. (See *Hernia.*)

When the reduction seems complete, the surgeon should assure himself of it, by introducing his finger into the cavity of the abdomen so as to feel that the parts are all actually reduced, and suffer no constriction between the edges of the wound and the viscera in the abdomen.

A difficulty of reduction may arise from the protruded intestines being distended with feces or air. In this circumstance, the contents of the gut may frequently be made to pass by degrees into that portion of the intestinal canal, which is within the abdomen. In order to accomplish this purpose, the surgeon must press the contents of the bowel toward the wound; and, if he succeeds in emptying the part, he will commonly experience equal success in his next attempt to replace it in the abdomen.

Sometimes, in cases of narrow stabs, considerable pieces of intestine protrude, and cannot be reduced without doing imprudent violence to the bowel. Under these circumstances, the dilatation of the wound is indispensable. However, when the reduction seems almost a matter of impossibility, on account of the smallness of the wound, if the surgeon be careful to relax the abdominal muscles, draw a little more intestine out of the wound, and gently press the contents of the bowel through the constriction into the abdomen, he will frequently succeed in reducing the parts, without using the knife.

When such operation is unavoidable, the dilatation should be made in a direction which will not endanger the epigastric artery, and, if possible, in the same line as the muscular fibres.

We are also advised to make the incision upward rather than downward, when it can be done with equal convenience, because it is supposed the first direction will be followed by less danger of hernia. (*Sabatier, Médecine Opératoire, T. 1, p.* 220, *Ed.* 2. *Callisen, Syst. Chir. Hod. T.* 1, *p.* 705.) If, however, the upper angle of the wound correspond to the direction of the suspensory ligament of the liver, writers advise making the dilatation at the lower angle, in order to incur no risk of hemorrhage from the umbilical vein. In the adult, this vessel is generally obliterated, and turned into a ligamentous substance; though it would appear that, in a few instances, it remains pervious to the navel. Hildanus saw a young man die instantly in consequence of a stab in the belly between the false ribs and the umbilicus; and, on opening the body, he found blood effused from a wound of the umbilical vein. It has been feared, also, that cutting the suspensory ligament of the liver might give rise to such a displacement of that viscus as would interrupt the freedom of respiration, or obstruct the circulation of the blood in the vena cava. But the apprehension is unfounded; for Riolan found this ligament ruptured and retracted towards the liver in a nimble Ethiopian female dancer, whose respiration had not suffered any particular disturbance during her lifetime. (*Sabatier, Méd. Opératoire, T.* 1, *p.* 220, 221, *Ed.* 2.)

The incision should never be larger than absolutely requisite, as hernia is much disposed to occur wherever the peritoneum has been divided. The operation may be done with a curved bistoury and a director, much in the same way as is done in cases of strangulated ruptures. (See *Hernia.*)

After the battle of Waterloo, many cases presented themselves in which the bowels and omentum protruded, and in several of these examples the reduction could not be effected before the wounds had been enlarged. So tightly also were the parts girt, that the operation was sometimes far from being easy.

Instead of enlarging wounds of the abdomen, it has been proposed to let out the air from the protruded intestines, by making small punctures with a needle, so as to lessen their volume sufficiently to make them reducible. The suggestion first originated with Paré, who declares that he has practised the method with success. Rousset, his contemporary, also informs us that the plan was adopted by another surgeon in an instance where the epigastric region was wounded, and a large portion of the intestines protruded in a strangulated state. Peter Lowe, an English surgeon, likewise assures us, that he frequently adopted the practice, when other means failed. Garengeot, Sharp, and Van Swieten, are all advocates for Paré's proposal; but they recommend the employment of a round needle, which will merely separate the fibres of the intestinal canal, without cutting them, as a flat, triangular, sharp-edged needle would unavoidably do. These last writers, however, only sanction the practice when the quantity of protruded intestine is great, and the bowel is so enormously distended with air, that it would be impossible to reduce the part, though the wound were enlarged, and every thing else put in practice, likely to bring about the reduction. But, as Sabatier remarks, the punctures must be entirely useless, if made with a fine needle, since they will be immediately stopped up with the mucous secretion, with which the inside of the bowels is constantly covered; and if the punctures are made with a broad triangular needle, or a very large round one, as Desault and Chopart advise, they must be highly dangerous, inasmuch as they are likely to give rise to inflammation, and even to extravasation, within the abdomen. (*Médecine Opératoire, T.* 1, *p.* 10.)

That small punctures in the bowel would not answer the purpose, but be obstructed by the villous or mucous coat, is a fact, which has been for a long time well known to surgeons. Callisen, among others, has particularly noticed it: "Acu puncturæ enim flatibus exitum parare nequeunt, siquidem tunica villosa foraminula obstruit," &c. (*Sys. Chir. Hod. T.* 2, *p.* 704.)

It was the circumstance of small punctures being unavailing, that led Desault and Chopart to recommend the use of a large round needle: "*pour que l'ouverture ne soit point bouchée par les mucosités dont les intestines sont enduits.*" But they were also aware of the danger of employing such an instrument, since they give us directions how to proceed in order to prevent extravasation and inflammation: *On pré viendra l'epanchement des matières stercorales en passant, avant de reduire l'intestin, une anse de fil dans la portion de mesentère qui répond à la piqure pour la fixer contre les bords de la plaie extérieure, et l'on combattra par les remèdes généraux l'inflammation que cet piqure peut attirer.*" (*Traité des Maladies Chirurg. T.* 2, *p.* 135.) Richerand is still an advocate for puncturing the bowel, for which operation he boldly recommends a small hydrocele trocar. (*Nosogr. Chir. T.* 3, *p.* 336, *Ed.* 4.)

Mr. Travers, one of the latest and best writers upon this subject, most properly joins in the condemnation of the plan of pricking the protruded bowels. "Blancard and others protested against this practice on the very sufficient ground of its inefficacy. La Faye very truly says, it is a useless as well as dangerous practice; for the openings made by a round needle cannot give issue to the contained air." Mr. Travers then cites two cases, showing that even small stabs in a bowel will not prevent its becoming distended with air.

"A man was brought to St. Thomas's hospital, on Saturday, the 30th of June last, (1811) who had been stabbed in the direction of the epigastric artery, on the left side of the abdomen, by a case knife. He died in eighteen hours, apparently from the sudden and copious hemorrhage, which had taken place within the belly. About half a yard of ileon was protruded. The gut was highly discoloured, and so much distended, notwithstanding it was pierced in three places, that the wound of the integuments required to be freely dilated before it could be returned. *The apertures were in fact obliterated by the mucous coat.*"

"It appeared upon the trial of Captain Sutherland (Ann. Reg. June 1809), for the murder of his cabin boy, that the intestines had been extensively protruded through a wound near the left groin, and had lain exposed for four or five hours; that the dirk had pierced through one fold of intestine, and entered another; that the wound of the intestine was *half an inch* long; that the reduction could not be accomplished until the parietal wound was dilated; and that the intestine was then returned, and the integuments sewed up." (*Travers on Injuries of the Intestines, p.* 174, 176.)

With respect to this last case, however, I must observe, that it does not satisfactorily prove what the author intends, namely, *that the bowel was distended with air, though there was a wound in it half an inch long*, for the evidence does not inform us that the difficulty of reduction was owing to this cause. I have seen a very small portion of omentum protrude through a wound, and baffle all endeavours to reduce it for nearly an hour. The first case adduced by Mr. Travers, however, is more explicit and interesting; and we are to infer from it, and the observations of Haller, Callisen, &c. that the punctures made in an intestine are not closed by mucus, as Sabatier and Desault have asserted, but by the mucous coat itself.

As the above expedient had been recommended by writers of some weight, I thought that the subject should not be passed over in silence, and without a caution to the reader, never to put any confidence in the method. The plan does not facilitate the business of the operator. There is not even this solitary reason in favour of the practice; and though it may have answered when large needles were used, and some patients so treated may have recovered, every person, who has the least knowledge of the animal economy, will easily comprehend how even the smallest opening, made in parts so irritable and prone to inflammation as the bowels, must be attended with greater danger than would result from enlarging a wound of the skin and muscles. Besides, the air may frequently be pressed out of the intestine in a safer way, as I have already described.

A wound of the abdomen, attended with one of the most considerable protrusions of the viscera that I have ever read of, is recorded by Mr. Hague, surgeon at Rippon: "August 30th, 1808 (says this gentleman) I went to Norton Mills, about four miles from hence, to see John Brown, æt. 12 years, who had received a wound in the abdomen by a wool shears. On my arrival, which was little more than an hour after the accident, I found the poor lad in a very distressing situation; the *great arch of* the stomach, and the *whole of the intestinal canal*, (duodenum excepted,) contained within the abdomen, having protruded through the wound. The incision was on the left side of the body, commencing at about two inches below the scrobiculus cordis, and extending in a straight line near four inches in length, distant from the navel two inches, and he was quite sensible, and had vomited so as to empty the stomach; very little blood was lost. I immediately proceeded very carefully to examine the protruded viscera, none of which were wounded, and reduced them as quickly as possible, beginning with the stomach, and following the regular course of the intestines, in the latter portion of which I distinctly felt feces of rather firm consistence. He complained of some pain during the reduction, though not much; and expressed great relief when the parts were completely returned. I now desired an assistant to lay the palm of his hand over the wound, and make some pressure upon it; for I found, that, without this, the parts would soon have protruded again by the action of respiration, which was oppressed and laborious. I brought the sides of the wound together by five sutures, beginning from above downwards, and passed the needle on each side, quite through the integuments with the peritoneum &c. The wound was also dressed with adhesive plaster, and covered with a bandage." (Vide *Edinburgh Medical and Surgical Journal, Vol.* 5, *p.* 129, *&c.*)

This case is interesting; for notwithstanding so unlimited a protrusion of the viscera, and the circumstance of the parts being left unreduced for more than an hour, a recovery ensued, under the judicious employment of bleeding, purging, anodynes, &c.

In la Caserne de St. Elizabeth at Brussels, after the battle of Waterloo, the number of protrusions of the viscera, which fell under my notice, were much more considerable, than what I previously had any idea of ever meeting with. I well remember, in my own part of the hospital, two protrusions of a large portion of the stomach; three of the bladder; and ten or twelve of the mesentery, omentum, or intestines.

Whether a suture should be used, when the protruded intestine is wounded, is a subject which will be noticed in considering wounds of the intestines.

Some of the exposed intestine may have mortified before the arrival of surgical assistance. In cases of wounds, this event is rare; but in those of strangulated herniæ it is not uncommon. The treatment is explained in the article *Hernia.*

When the protruded intestine is in a state of inflammation, its immediate reduction is, beyond all dispute, the means most likely to set every thing right. Even when the inflammation is considerable, a timely reduction of the displaced part, and the employment of antiphlogistic means, will often prevent gangrenous mischief. The dull, brown, dark red colour of the intestine may induce the practitioner to suppose, either that the part is already mortified, or must inevitably become so, and consequently, he may delay returning it into its natural situation. But notwithstanding this suspicious colour of the intestine, its firmness will evince, that it is not in a state of gangrene. The ultimate recovery of a portion of intestine, so circumstanced, is always a matter of uncertainty; but the propriety of speedily replacing the part in its natural situation, is a thing most certain. "Partes egressæ sanæ (observes Callisen) citissime sunt reponendæ, neque obstat mutatio coloris nativi in rubrum subfuscum." (*Syst. Chir. Hod. T.* 1, *p.* 703, *edit.* 1798.) In case the bowel mortify after its reduction, all hopes of the preservation of life are not to be abandoned; as I have noticed in the articles *Anus, artificial,* and *Hernia,* in which last part of the book, many things, necessary to be known, concerning the mode of reducing protruded omentum, will also be found.

When a piece of intestine cannot be reduced, granulations and new skin sometimes grow over it, and a cure follows, as the experience of Callisen confirms. (*Op. cit. p.* 706.)

The protruded viscera having been reduced, the next object is to retain them in the abdomen, until the wound is completely healed. When the wound is small, this is a matter of no difficulty; for it is enough to put the patient in a position which will relax the fibres of the wounded muscles, while the edges of the wound are maintained in contact with sticking-plaster, and supported by a compress and bandage. Costiveness is to be removed by the mildest purgatives, such as the oleum ricini, or by laxative clysters, which are still preferable. But in cases of extensive wounds, even when the treatment is conducted with all possible judgment, it is occasionally difficult, and even impossible, to hinder the protrusion of the bowels by common dressings and a bandage. In this circumstance the edges of the wound must be sewed together. (See *Gastroraphe.*) In modern times, however, sutures are much more seldom employed than formerly, and in the above article, some remarks are offered, proving that the generality of wounds of the abdomen do not require the practice.

When the omentum protrudes, and is strangulated by the narrowness of the opening, it soon contracts adhesions to it, unless speedily reduced. Should such connexion be already formed, when the surgeon is first consulted, we are advised to cut off the portion which exceeds the level of the integuments, and to leave the rest in the wound. The latter will block up the opening, and have the good effect of preventing hernia. (*Richerand, Nosogr. Chir. T.* 3, *p.* 339, *edit.* 4.) When the protruded omentum is sound and free from adhesions, it ought to be reduced without delay. But, when the protrusion is large, and there is reason to fear, from the vomiting and the pains shooting from the wound to the epigastric region, that the stomach is dragged, the displaced part must be made free, and if sound, reduced. Should it be in a mortified state, the dead part must be previously cut away, and any vessels which bleed, tied separately with a piece of fine thread, or silk, both ends of which may either be cut off close to the knot, and the part then reduced; or one end of the silk may be left out of the wound, and the other cut away. Practitioners who apprehend ill effects from leaving within the abdomen so small a particle of extraneous matter, as the little knot of fine thread, will prefer the last method, and withdraw the ligature altogether, as soon as it becomes loose.

Extravasation in the Abdomen.—Wounds of the abdomen may be complicated with extravasations of blood, chyle, excrement, bile, or urine. None of these complications, however, are half so frequent, as an inexperienced practitioner would apprehend. The employment of the phrase *cavity of the abdomen* has paved the way to much erroneous supposition upon this subject, and has induced many absurd notions, which even the sensible observations, long ago published by J. L. Petit, have scarcely yet dispelled.

As a modern writer has observed: "There is not truly any cavity in the human body, but all the hollow bowels are filled with their contents, all the cavities filled with their hollow bowels, and the whole is equally and fairly pressed. Thus, in the abdomen, all the viscera are moved by the diaphragm and the abdominal muscles upwards and downwards, with an equable continual pressure, which has no interval; and one would be apt to add, the intestines have no repose, being kept thus in continual motion; but though the action of the diaphragm, and the reaction of the abdominal muscles are alternate, the pressure is continual; the motion which it produces, (they produce) is like that which the bowels have, when we move them forwards in walking, having a motion, with respect to space, but none with regard to each other, or to the part of the belly which covers them; the whole mass of the bowels is alternately pressed, to use a course illustration, as if betwixt two broad boards, which keep each turn or intestine in its right place, while the whole mass is regularly moved. When the bowels are forced down by the diaphragm, the abdominal muscles recede: when the bowels are pushed back again, it is the reaction of the abdominal muscles, that forces them back and follows them; there is never an instant of interruption of this pressure, never a moment, in which the bowels do not press against the peritoneum; nor is there the smallest reason to doubt that the same points in each are continually opposed. We see that the intestines do not move, or, at least, do not need to move in performing their functions: for in hernia, where large turns of intestines are cut off by gangrene, the remaining part of the same intestines is closely fixed to the groin, and yet the bowels are easy, and their functions regular. We find the bowels regular, when they lie out of the belly, in hernia, as when a certain turn of intestine lies in the scrotum or thigh, or in a hernia of the navel; and where yet they are so absolutely fixed, that the piece of intestine is marked by the straitness of the rings. We find a person, after a wound of the intestine, having free stools for many days; and what is it that prevents the feces from escaping but merely this regular and universal pressure? We find a person, on the fourth or fifth day, with feces coming from the wound! a proof, surely, that the wound of the intestine is still opposite or nearly opposite to the external wound. We find the same patient recovering without one bad sign! What better proof than this could we desire, that none of the feces have exuded into the abdomen?

"If in a wound of the stomach, the food could get easily out by that wound, the stomach would unload itself that way, there would be no vomiting, the patient must die; but so regular and continual is this pressure, that the instant a man is wounded in the stomach, he vomits, he continues vomiting for many days, while not one particle escapes into the cavity of the abdomen. The outward wound is commonly opposite to that of the stomach, and by that passage, some part of the food comes out; but when any accident removes the inward wound of the stomach from the outward wound, the abdominal muscles press upon the stomach, and follow it so closely, that if there be not a mere laceration extremely wide, this pressure closes the hole, keeps the food in, enables the patient to vomit, and not a particle, even of jellies, or soups, is ever lost, or goes out into the cavity of the belly.

"How (proceeds Mr. J. Bell) without this universal and continual pressure, could the viscera be supported? Could its ligaments, as we call them, support the weight of the liver? Or what could support the weight of the stomach when filled? Could the mesentery, or omentum, support the intestines; or could its own ligaments, as we still name them, support the womb? How, without this uniform pressure, could these viscera fail to give way and burst? How could the circulation of the abdomen go on? How could the liver and spleen, so turgid as they are with blood, fail to burst? Or what possibly could support the loose veins and arteries of the abdomen, since many of them, e. g. the splenic vein, is (are) two feet in length, is (are) of the diameter of the thumb, and has (have) no other than the common pellucid and delicate coats of the veins? How could the viscera of the abdomen bear shocks and falls, if not supported by the universal pressure of surrounding parts? In short, the accident of hernia being forced out by any blow upon the belly, or by any sudden strain, explains to us how perfectly full the abdomen is, and how ill it is able to bear any pressure, even from its own muscles, without some point yielding, and some one of its bowels being thrown out. And the sickness and faintness, which immediately follow the drawing off of the waters of a dropsy, explain to us, what are the consequences of such pressure being even for a moment relaxed. But, perhaps, one of the strongest proofs is this, that the principle must be acknowledged, in order to explain what happens daily in wounds; for though in theory we should be inclined to make this distinction, that the hernia, or abscess of the intestines will adhere and be safe, but that wounded intestines, not having time to adhere, will become flaccid, as we see them do in dissections, and so, falling away from the external wound, will pour out their feces into the abdomen, and prove fatal; though we should settle this, as a fair and good distinction in theory, we find that it will never answer in practice. Soldiers recover daily from the most desperate wounds; and the most likely reasons, that we can assign for it, are the fulness of the abdomen, the universal, equable, and gentle pressure; and the active disposition of the peritoneum, ready to inflame with the slightest touch. The wounded intestine is, by the universal pressure, kept close to the external wound, and the peritoneum and the intestine are equally inclined to adhere. In a few hours, that adhesion is begun, which is to save the patient's life, and the lips of the wounded intestine are glued to the lips of the external wound. Thus is the side of the intestine united to the inner surface of the abdomen; and though the gut casts out its feces, while the wound is open; though it often casts them out more freely, while the first inflammation lasts; yet the feces resume their regular course, whenever the wound is disposed to close." (*John Bell's Discourses on Wounds, p.* 323, 327, *Edit.* 3.)

The foregoing extract, though drawn up in a careless style, contains such observations as are well calculated to make the reader understand, that the abdomen is in reality not a cavity, but a compact mass of containing and contained parts; that the close manner, in which the various surfaces are constantly in contact most powerfully oppose extravasations; and that, in fact, it often entirely prevents them. The passage cited impresses us with the utility of that quick propensity to the adhesive inflammation, which prevails throughout every peritoneal surface, and which not only often has the effect of permanently hindering effusion of the contents of the viscera, by agglutinating the parts together, but which, even when an extravasation has happened, beneficially confines the effused blood in one mass, and surrounds it with such adhesions of the parts to each other, as are rapid in their formations, and effectual for the purposes of limiting the extent of the effusion, and preventing the irritation of the extravasated matter from affecting the rest of the abdomen.

It is to Petit that surgeons are indebted for more correct modes of thinking upon the foregoing subject, and it is with great pleasure that I here refer to his valuable observations. (See *Mem. de l'Acad. de Chir.*)

But notwithstanding the reciprocal pressure of the containing and contained parts against each other, and the useful effect of the quickly arising adhesive inflammation, in all penetrating wounds of the belly, complicated with injuries of the viscera, we are not to suppose, that extravasation never happens; but only that it is much less frequent than has been commonly supposed. Mr. Travers, with much laudable industry, has endeavoured to trace more minutely, than any preceding writer, the particular circumstances, under which effusions in the abdomen are likely or unlikely to happen." It being admitted (says he) that there are cases in which effusion does take place, it is easy to conceive circumstances which must considerably influence this event. If, for example, the stomach and bowels be in a state of emptiness, the nausea which follows the injury will maintain that state. If the extent of the wound be considerable, the matter will more readily pass through the wound, than along the canal. A wound of the same dimensions in the small and large intestines, will more readily evacuate the former than the latter, because it bears a larger proportion to the calibre. Incised and puntured wounds admit of the adhesion of the cut edges, or the eversion of the internal coat of the gut, so as to be in many instances actually obliterated; whereas lacerated, or ulcerated openings, do not admit of these salutary processes. Again, in a transverse section of the bowel, contraction of the circular fibre closes the wound, whereas in a longitudinal section, the contraction of the fibre enlarges it. Such (says Mr. Travers) are the circumstances, which combined, in a greater or less degree, increase or diminish the tendency to effusion." (*On Injuries of Intestines, &c. p.* 13, 14.)

After the details of some experiments and cases, the preceding author makes, among other conclusions, the following:

1. That effusion is not an ordinary consequence of penetrating wounds.

2. That if the gut be full and the wound extensive, the surrounding pressure is overcome, by the natural action of the bowel tending to the expulsion of its contents.

3. That, if food has not recently been taken, and the wound amounts to a division of the gut, or nearly so, the eversion and contraction of the orifice of the tube prevent effusion.

4. That if the canal be empty at the time of the wound, no subsequent state of the bowel will cause effusion, because the super-

vening inflammation agglutinates the surrounding surfaces, and forms a circumscribed sac; nor can effusion take place from a bowel at the moment full, provided it retains a certain portion of its cylinder entire, the wound not amounting nearly to a semidivision of the tube, for then the eversion and contraction are too partial to prevent an extravasation.

5. That, when however air has escaped from the bowel, or blood has been extravasated in quantity within the abdomen at the time of the injury, the resistance, made to effusion, will be less effectual, although the parietal pressure is the same, as such fluids will yield more readily, than the solids naturally in contact. (*P.* 25, 26, 100.)

"That, though extravasation is not common in penetrating wounds, it follows more generally in cases, where the bowel is ruptured by blows, or falls upon the belly, while the integuments continue unwounded. (*P.* 36.)

7. That when the bowels are perforated by ulceration, there is more tendency to effusion, than in cases of wounds. (*P.* 38, &c.)

Mr. Travers attempts to explain the reason of the greater tendency to effusion, in cases of intestine burst by violence, than in those of ulceration, "by the difference in the nature of the injury, which the bowel sustains, when perforated by a sword or bullet, as in the one case, or burst or ulcerated in the other. A rupture by concussion could only take place under a distended state of the bowel, a condition most favourably to effusion, and from the texture of the part, a rupture so produced would seldom be of limited extent. The process of ulceration, by which an aperture is formed, commences in the *internal* coat of the bowel, which has always incurred a more extensive lesion, than the peritoneal covering. The puncture, or cut, is merely a solution of continuity in a point, or line; the ulcerated wound is an actual loss of substance. The consequence of this difference is, that, while the former, if small, is glued up by the effusion from the cut vessels, or, if large, is nearly obliterated by the full eversion of the villous coat, the latter is a permanent orifice." (*P.* 46.)

How much Mr. Travers and Mr. John Bell differ in opinion, upon these latter points, will appear from the following passage: after adverting to the adhesion, which takes place between the viscera and the peritoneum, under a variety of circumstances attending disease, Mr. John Bell observes: "This it is, which makes the chief difference, in point of danger, betwixt an ulcerated and a wounded intestine; for, in a wound, there is, as we should suppose, no time for adhesion, nothing to keep the parts in contact, no cause, by which the adhesion might be produced. But, in an ulcer, there is a slow disease, tedious inflammation, adhesion at first, and abscess, and bursting afterward; sometimes a fistula remains discharging feces, and sometimes there is a perfect cure. If a nutshell, a large coin, a bone, or any dangerous thing be swallowed, it stops in the stomach, causing swelling and dreadful pain; at last, a hard firm tumour appears, and then it suppurates, bursts, the bowel opens, the food is discharged at every meal, till the fistula gradually lessens, and heals at last. But where the stomach is cut with a broad wound of a sabre, the blood from the wounded epiploic vessels, or the food itself, too often pours out into the abdomen, and the patient dies, &c." (*Discourses on Wounds, p.* 321, *edit.* 3.) The author afterward proceeds to explain, how in cases of penetrating wounds, the compact state of the containing and contained parts, and the incessant and equable pressure, which the viscera sustain, frequently hinder effusion.

Which of these gentlemen is most correct, I cannot pretend to determine, and whether Mr. Travers's cases are deviations from what is most common, can only be decided by a comparative examination of a greater number of facts. When the intestines ulcerate, and thus rid themselves of foreign bodies, the general tenor of the cases on record undoubtedly affords us little reason to be apprehensive of extravasation Yet, with respect to ulceration of the intestines from other causes, circumstances may be very different. And it is but justice to state, That Mr. Travers's opinions have received some confirmation from an interesting case, published by Dr. J. Crampton, of Dublin. It is an instance of rupture of the stomach, and fatal effusion of its contents into the cavity of the abdomen. The patient was a young lady, aged 29. She was suddenly taken ill with spasm in her stomach, and other severe symptoms, and died in about twelve hours. "On opening the abdomen, the stomach was observed to be pale, flaccid, and empty. Its contents, among which were recognized oatmeal and castor oil, had escaped into the cavity of the abdomen, through a round aperture situated on its anterior surface, at the union of the cordiac and pyloric portions. This perforation of the stomach was perfectly circular, about the size of a pea, and appeared to be the result of an ulcer on the mucous surface, which had gradually penetrated the other coats. This ulcer was hollow and circular, nearly the size of a shilling, and had the appearance, as if it had been made with caustic, with the orifice in its centre." (*J. Crampton, Med. Chir. Trans. Vol.* 8, *p.* 230.) To the preceding, Mr. Travers has annexed some additional facts: one is an example of a rapidly fatal effusion of the intestinal contents, through an ulcerated opening about a finger's breadth below the pylorus. The foramen had a peritoneal margin, and proved to be the centre of an irregular superficial ulcer of the mucous coat. Another case is that of a similar ulceration of the small intestines, and fatal extravasation of their contents. In another example, a circular aperture of the peritoneum, large enough to admit a crow's quill, was found after death at the junction of the duodenum and stomach. It also was the centre of an ulcer, that had destroyed the villous and muscular coats of the bowel to the extent of half an inch. For many other ingenious observations, I must refer the reader to Mr. Travers's paper, who concludes with remarking, that the chief diagnostic symptoms of these hopeless cases appear to be:

1. Sudden, most acute, and unremitting pain, radiating from the scrobiculus cordis, or the navel, to the circumference of the trunk, and even to the limbs. A peculiar pain, the intensity of which, like that of parturition, absorbs the whole mind of the patient, who, within an hour from the enjoyment of perfect health, expresses his serious and decided conviction, that if the pain be not speedily alleviated, he must die.

2. Coeval with the attack of pain, remarkable rigidity and hardness of the belly, from a fixed and spastic contraction of the abdominal muscles.

3. A natural pulse for some hours, until the symptoms are merged in those of acute peritonitis, and its fatal termination in the adhesive stage. (*Med. Chir. Trans. Vol.* 8, *p.* 231, *et seq.*)

Blood is more frequently extravasated in the abdomen, than any other fluid, but, it does not always take place, unless the wounded vessels be above a certain magnitude. The compact state of the abdominal viscera, in regard to each other, and their action on each other, oppose this effect. The action alluded to, which depends on the abdominal muscles and diaphragm is rendered very manifest by what happens in consequence of operations for herniæ, attended with alteration of the intestines, or omentum. If these viscera burst, or suppurate, after being reduced, the matter which escapes from them, or the pus which they secrete, is not lost in the abdomen; but is propelled towards the wound in the skin, and there makes its exit. The intestinal matter effused from a mortified bowel, has been known to remain lodged the whole interval, between one time of dressing the wound and another, in consequence of the surgeon stopping up the external wound with a large tent. When the above-mentioned action or pressure of the muscles, is not sufficient to keep the blood from making its escape from the vessels, still it may hinder it from becoming diffused among the convolutions of the viscera, and thus the extravasation is confined in one mass. The blood, effused and accumulated in this way, is commonly lodged at the inferior and anterior part of the abdomen, above the lateral part of the pubes, and by the side of one of the recti muscles. The weight of the blood may propel it into this situation, or perhaps, there may be less resistance in this direction, than in others. In opening the bodies of persons, who have died with such extravasations, things may put on a different aspect, and the blood seem to be promiscuously extravasated over every part of the abdomen. But, when such bodies are examined with care, it will be found, that the blood does not insinuate itself among the viscera, till the moment when the abdomen is opened, and the mass previously lies in a kind of pouch. This pouch is frequently circumscribed, and bounded by thick membranes, especially when the extravasation has been of some standing. (*Sabatier Médecine Opératoire, T.* 1, *p.* 28—30.)

Every practical surgeon should remember well that all the abdominal viscera closely touch either each other, or the inner surface of the peritoneum. This is one grand reason, why extravasations are seldom extensively diffused; but, commonly lie in one mass, as Petit, Sabatier, and all the best moderns have noticed. The pressure of the elastic bowels, diaphragm, and abdominal muscles, not only frequently presents an obstacle to the diffusion of extravasated matter, but often serves to propel it towards the mouth of the wound. The records of surgery furnish numerous instances, in which persons have been stabbed through the body, without fatal consequences, and sometimes without the symptoms being even severe. In Mr. Travers's publication many cases, exemplifying this observation, are quoted from a variety of sources: Fab. Hildan. Obs. Chirurg. Cent. 5. Obs. 74. Œuvres de Paré, liv. 10. Chap. 35. Wiseman's Surgery, p. 371. La Motte's Traité Complet de Chirurgie, &c. &c. In such cases, the bowels have been supposed to have eluded the point of the weapon, and, perhaps, in a few instances, this may actually have been the fact; but, in the generality of such examples, the bowels must have been punctured, and the extravasation of intestinal matter prevented by the pressure of the viscera against each other.

The pouch, or cyst, in which the extravasated blood, or matter, lies, as mentioned by Sabatier, is formed by the same process, which circumscribes the matter of abscesses. (See *Suppuration.*) It is, in short, the adhesive inflammation. All the surfaces in contact with each other, and surrounding the extravasation, and track of the wound, generally become so intimately connected together by the adhesive inflammation, that the place, in which the extravasation is lodged, is a cavity entirely destitute of all communication with the cavity of the peritoneum. The track of the wound leads to the seat of the effused fluid, but has no distinct opening into the general cavity of the abdomen. The rapidity, with which the above adhesions frequently form, is almost incredible.

It should be known, however, that extravasations are occasionally diffused in various degrees among the viscera, owing to the patient being subjected to a great deal of motion, or affected with violent spasmodic contractions of the intestines. Urine and bile are also generally dispersed to a great extent. As for blood, its disposition to coagulate, must often tend both to stop further hemorrhage, and confine the extravasation in one mass.

Symptoms and Treatment of Extravasations in the Abdomen. 1. *Blood*—Wounds of the spleen, and of very large veins and arteries in the abdomen, almost always soon prove fatal from internal hemorrhage. The blood generally makes its way downwards, and accumulates at the inferior part of the abdomen, unless the presence of adhesions happen to oppose the descent of the fluid to the most depending situation. The belly swells, and a fluctuation is perceptible. The patient grows pale, loses his strength, is affected with syncope, and his pulse becomes weak, and scarcely distinguishable. In short, the symptoms usually attendant on profuse hemorrhage are observable. As the viscera and vessels in the abdomen are compressed on all sides by the surrounding parts, the blood cannot be effused without overcoming a certain degree of resistance; and unless a vessel of the first magnitude, like the aorta, the vena cava; or one of their principal branches, has been wounded, the blood escapes from the vessel slowly, and several days elapse, before any considerable quantity accumulates.

In these cases, the symptoms, which perhaps had disappeared under the employment of bleeding and anodyne medicines, now recur. A soft fluctuating tumour may be felt at the lower part of the abdomen; sometimes on the right side; sometimes on the left; but occasionally on both sides. The pressure made by the effused blood, on the urinary bladder, excites distressing inclinations to make water; while the pressure, which the sigmoid flexure of the colon suffers, is the cause of obstinate constipation. In the mean time, as the quantity of extravasated blood increases, the peritoneum inflames. The pulse grows weaker; debility ensues; the countenance becomes moistened with cold perspirations; and according to some writers, unless the surgeon practise an incision for the discharge of the fluid, the patient falls a victim to the accident.

In the year 1733, Vacher adopted this treatment with success. Petit afterward tried the same plan, though it did not answer, (as is alleged) in consequence of the inflammation having advanced too far before the operation was performed. Long before the time of Vacher and Petit, a successful instance of similar practice was recorded by Cabrole, in a work which this author published, under the title of *Αλφαβητον ανατομικον*: id est, Anatomes elenchus accuratissimus, omnes humani corporis partes eâ quâ solent secari methodo, delineans. Accessêre osteologia, observationesque Medicis ac Chirurgicis perutiles. Genevæ 1604. The method pursued by Vacher, was therefore not so new as Petit imagined.

Indeed, when the symptoms leave no doubt of there being a large quantity of blood extravasated in the abdomen; when the patient's complaints are of a very serious nature, and are evidently owing to the irritation and pressure of the blood on the surrounding viscera; and when a local swelling denotes the seat of the extravasation, there cannot be two opinions about the propriety of making an incision for its evacuation.

Surgeons should recollect, however, that if no opening be made, a small extravasation of blood may not produce any considerable irritation. On the contrary, when the cyst including the blood is opened, the air then has access, and that part of the fluid which cannot be discharged, putrifies and becomes so irritating, as to be a true cause of inflammation. The bad symptoms are also sometimes chiefly owing to the injury done to parts within the abdomen, and still more commonly to inflammation within that cavity, arising rather from the wound than from the presence of effused blood. On the whole, I am disposed to join a late writer in the belief, that the practice of discharging extravasated blood from the abdomen can rarely be adviseable—(See *Hennen's Mil. Surgery, P.* 412, *ed.* 2.)

2. *Chyle and Feces.*—These are not so easily extravasated in the abdomen as blood, because they do not require so much resistance, on the outside of the stomach and intestines, to make them continue their natural route through the alimentary canal, as blood requires to keep it in the vessels. However, when the wound is large, and the bowel distended at the moment of the injury, or when, as Mr. Travers has explained, air is extravasated, or blood effused in the abdomen, which fluids are incapable of making effectual resistance to the escape of the intestinal matter, the latter may be effused. (See *an Inquiry into the Process of Nature in repairing Injuries of the Intestines, &c. p.* 26.) Nothing is a better proof of the difficulty, with which chyle and feces are extravasated, than the operation of an emetic, when the stomach is wounded and full of aliment. In this instance, if the resistance to the extravasation of the contents of the stomach were not considerable, they would be effused in the abdomen, instead of being vomited up. A peculiarity in wounds of the stomach and intestines is, that the opening, which allows their contents to escape, may also allow them to return into the wounded viscus.

Extravasation of intestinal matter in the abdomen is attended with severe febrile symptoms; considerable pain and swelling of the belly; convulsive startings; and hiccough and vomiting, with which the patients are generally attacked the day after the receipt of the wound. (*Sabatier, Méd. Opératoire, T.* 1, *p.* 34.)

In these cases, only general means can be employed; venesection, leeches, fomentations, low diet, perfect rest, anodynes, &c. All solid food must be strictly prohibited. If pressure can be borne without inconvenience, as is sometimes the case in the early stage, the close state of the viscera may be increased by the application of a bandage round the body.

If the symptoms are not speedily assuaged, the inflammation spreads over the whole cavity of the abdomen, gangrenous mischief takes place, and the patients die in the course of a few days.

3. *Bile*—Bile, on account of its great fluidity, is more apt to be widely extravasated in the abdomen, than either blood, or the contents of the stomach and intestines. However, on account of the small size of the gall bladder, and its deep guarded situation, between the concave surface of the liver, and upper part of the transverse arch of the colon, wounds of it are uncommon.

Sabatier informs us, that he has only been able to find one example on record. This case was communicated to the Royal Society of London, by Dr. Stewart (No. 414, pag. 341. Abridgm. Vol. 7, pag. 571—572,) A wound penetrated the cavity of the abdomen, and entered the fundus of the gall bladder, without doing any material injury to the adjacent parts. The abdomen was immediately distended, as if the patient had been afflicted with an ascites, or tympanitis; nor did the swelling either increase or diminish, till the patient's death, which happened in a week.

Though there was a great deal of tension, there was no rumbling noise in the abdomen. No stools, and very little urine were discharged, notwithstanding purgatives and clysters and a good deal of liquid nourishment, were given. Anodynes failed to procure one instant of sound sleep, and the patient was incessantly in a most restless state. There was no appearance of fever, and the pulse was always natural till the last day of the patient's life, when it became intermittent. After death, the intestines were found much distended, the gall bladder quite empty, and a large quantity of bile extravasated.

Sabatier had an opportunity of noticing the symptoms of an extravasation of bile, in consequence of a wound of the gall bladder. The patient's abdomen swelled very quickly; his respiration became difficult, and he soon afterward complained of tension and pain in the right hypochondrium. His pulse was small, frequent, and contracted; his extremities were cold, and his countenance very pale. The bleedings which were practised the first day, gave him a little relief; but the tension of the abdomen, and the difficulty of breathing, still continued. A third bleeding threw the patient into the lowest state of weakness, and he vomited up a greenish matter. On the third day, the lower part of the belly was observed to be more prominent, and there was no doubt of an extravasation. Sabatier introduced a trocar, and gave vent to a green blackish fluid, which had no smell, and was pure bile that had escaped from the wound of the gall bladder. After the operation, the patient grew weaker and weaker, and died in a few hours. On opening the body, a large quantity of yellow bile was found between the peritoneum and intestines; but it had not insinuated itself among the convolutions of the viscera. A thick gluten connected the bowels together, and they were prodigiously distended. The gall bladder was shrivelled, and almost empty. Towards its fundus, there was a wound, about a line and a half long, corresponding to a similar wound in the peritoneum. The wound which had occurred at the middle and lower part of the right hypochondrium, between the third and fourth false ribs, had glided from behind forward, and from above downward, between the cartilages of the ribs, until it reached the fundus of the gall bladder.

Sabatier takes notice, that the symptoms of the two cases, which have just now been related, were very similar. Both the patients were affected with an exceedingly tense swelling of the belly, unattended with pain, or borborygmus, and they were both obstinately constipated. Their pulse was extremely weak the latter days of their indisposition, and they were afflicted with hiccough, nausea, and vomiting.

Sabatier seems to think one thing certain, viz. that wounds of the gall bladder attended with effusion of bile, are absolutely mortal, and that no operation can be of any avail. (*Médecine Opératoire, T.* 1, *p.* 34—37.)

A contrary inference, however, may be drawn from a case, detailed by Paroisse, in which a bullet had lodged in the gall bladder two years. (*Opuscules de Chir. p.* 255.) The recovery published by Mr. Fryer, of Stamford, tends also to prove, that every effusion of bile is not unavoidably fatal. A boy, about thirteen years old, received a violent blow from one of the shafts of a cart, on the region of the liver. The injury was succeeded by pain, frequent vomiting of bilious matter, great sinking, coldness of the extremities, and a weak, small, fluttering pulse. The belly was fomented, and purging clysters thrown up. On the third day, symptoms of inflammation began, attended with considerable pain about the liver, great tension and soreness of the abdomen, and frequent vomiting. The pulse was quick, small, and weak; the skin hot and dry; the tongue much furred; the urine high-coloured; and there was some difficulty of breathing; and great thirst. Eight ounces of blood were taken away, the fomentations continued, and a few grains of calomel were directed to be given every four hours until the bowels were properly opened. Afterward, the effervescing mixture, with ten drops of laudanum, was exhibited every four hours.

On the following day, the patient had some motions, and was much better; but, as his sickness continued, he was ordered a grain of opium every four hours. About a week afterward, he complained of a great increase of pain, which was somewhat relieved by a blister. He was now completely jaundiced, and his stools were white, but the tension, pain, and sickness were abated.

Two days afterward, a fluctuation was perceived in the abdomen, which, in another week, became considerably distended with fluid. The patient did not now complain of much pain; but appeared to be sinking fast; a puncture was made in the swelling, and thirteen pints of what appeared to be pure bile were evacuated. The bowels then soon became regular, and the appetite good. In twelve days, the operation was repeated, and fifteen pints of the same bilious fluid were drawn off. Nine days afterward, another puncture was made, and thirteen pints more let out; and six were discharged in another fortnight. From this period the boy went on well, and perfectly recovered under the use of light tonic medicines. (See *Med. Chir. Trans. Vol.* 4, *p.* 330.)

A previous accidental adhesion of the gall badder to the peritoneum might also prevent the extravasation of bile, and its dangerous effects. (*Callisen, Syst. Chir. Hodiernæ, T.* 1, *p.* 718.)

According to Dr. Hennen, a deep wound of the liver is as fatal as if the heart itself was engaged. The slighter injuries are recoverable. He states, that the usual symptoms of a wound of the liver are yellowness of the skin and urine; derangement of the alimentary canal, and great and distressing itching of the skin. The discharge from the wound is generally yellow and glutinous; though sometimes either serous, or like unmixed bile. (*On Military Surgery, Ed.* 2, *p.* 429.) For some other interesting observations on wounds of the liver, I have great pleasure in referring to the latter work. (See also *Wedekind de Vulnere Hepatis Curato, Jenæ,* 1735; and *Thomson's Report of Obs. made in the Military Hospitals in Belgium, 8vo.* 1816.)

4. *Urine.*—Urine being of a very fluid nature, may, like the bile, be extensively diffused in the abdomen, when the bladder is wounded at any part, connected with the peritoneum. If, in this kind of case, the urine be not drawn off with a catheter, so as to prevent its extravasation, the patient soon perishes. Many instances are recorded of the bladder being injured even by gunshot wounds, which were not mortal.

Wounds of the bladder are attended with a discharge of bloody urine and difficulty of making water. They are always dangerous cases, both on account of the risk of the effusion of so irritating a fluid in the abdomen, and of the chance of extravasation in the cellular membrane. Under proper treatment, however, they often admit of cure. (See *Gunshot Wounds.*) If possible, the effused fluid should be discharged by a depending posture, or suitable punctures, or incisions, and the recurrence of extravasation prevented by the introduction of a catheter, which is to be left in the urethra. The patient must also be allowed little drink. As for the tension and pain of the belly, the common attendants of a wounded bladder, they may be greatly relieved by the use of the warm bath, (*Callisen, T.* 1, *p.* 719.) bleeding, low diet, and other antiphlogistic means not being omitted.

Wounds of the Stomach.—As Dr. Hennen has observed, these cases are extremely dangerous, though not always mortal. "Baron Percy calculates, that of twenty cases, four or five only have escaped; this, however, is a most favourable average." Two cures of wounds of the stomach are reported by Dr. Thomson. (*Obs. made in the Military Hospitals in Belgium, &c.*) With respect to the chances of recovery, Dr. Hennen justly remarks, that, in the histories of the Bohemian, Prussian (*D. Beckher de Cultrivoro Prussiaco,* 12*mo. Lugd.* 1638,) and English "Cultri-sores," in some of whom the knives have been cut out, and in others, discharged spontaneously through the coats of the stomach and parietes of the abdomen, are very encouraging. Hevin has collected many instances of recovery both from incised and gunshot wounds of the stomach. (*Mém. de l'Acad. de Chir. T.* 1.) But, according to Dr. Hennen, Ploucquet, in the articles "Ventriculus" and "Pantophagi," has brought together the largest number of cases. Dr. Hennen, also refers to *Lowthorpe's Abridgment of the Phil. Trans. Vol.* 6, *p.* 192, for instances, in which the stomach of a horse was wounded and sewed up, and the same practice extended to the human subject, with success. It appears also from the "Annales de Literature," &c. T. 2, by Kluyskens, from Schlichting's "Traumatologia," and the "*Bulletin de la Faculté,*" *&c. Tom.* 5, *p.* 386, that wounds of the human stomach have been stitched with success in various cases of recent date. (See *Hennen's Military Surgery, Ed.* 2, *p.* 438.) As the latter author observes, wounds of the stomach not unfrequently become fistulous and remain open. In a case, recorded by Richerand. the fistula continued open nine years; and in another instance, related by Ettmuller, ten years. (*De Vulnere Ventriculi Programma, Lip.* 1730.) And Wencker has detailed a case, in which the opening continued twenty-seven years. (See *Halleri Dissert. Chir. Vol.* 5, *art.* 19.) For farther information, connected with this subject, the reader may also consult, *Jungen, de Lethalitate Vulnerum Ventriculi, Helmst.* 1751; and *Ludov. Horn, de Ventriculi Ruptura,* 8*vo. Berol.* 1817. Also *Med. Chir. Journ. Vol.* 5, *p.* 72.

Wounds of the Intestines.—The vomiting of blood, or discharge of it by stool; the escape of fetid air, or of intestinal matter, from the mouth of the wound; an empty collapsed state of a portion of bowel, protruded at the opening in the skin, are the common symptoms attending a wound of this kind. When the wound is situated in the protruded portion, it is obvious to the surgeon's eye; but when it affects a part of the intestinal canal within the abdomen, the nature of the case can be known only by a consideration of other symptoms. In addition to such as I have already described, there are some others, which ordinarily accompany wounds of the bowels; as, for instance, oppression about the præcordia, acute or griping pain in the belly, cold sweats, syncope, &c. But, unless the wounded intestine protrude, there is no practical good in knowing whether the bowel is injured or not, since, if it be in the abdomen, the treatment ought not to be materially different from that of a simple penetrating wound of the belly, unattended with a wound of any of the viscera. Large wounds of the small intestines, particularly of the duodenum and jejunum, are attended with acute fever, anxiety, paleness of the countenance, syncope, cold perspirations, a small, intermitting, tremulous pulse, and they frequently prove fatal. Injuries of the small intestines are also more often, than those of the large ones, followed by extravasation. A total division of the upper part of the intestinal canal, towards the pylorus, will deprive the body of the nourishment requisite for its support. If the chyle escape from the wound, the patient will die of a slow marasmus; and if it become extravasated, it will be likely to excite such irritation as will prove fatal. The escape of excrement, or of fetid air from the wound, indicates an injury of one of the large intestines. In these cases, the symptoms are generally milder, and the passage of the intestinal contents outward through the wound more easy, on account of the bowel being less moveable. For the same reason, the wounded intestine more readily contracts an adhesion to the adjacent parts. (*Callisen, Syst. Chirurgiæ Hodiernæ, T.* 1, *p.* 717.)

A wounded intestine is said to present some particular appearances, to which the generality of writers have paid no attention: "If a gut be punctured, the elasticity of the peritoneum, and the contraction of the muscular fibres, open the wound, and the villous, or mucous coat, forms a sort of hernial protrusion, and obliterates the aperture. If an incised wound be made, the edges are drawn asunder, and reverted so that the mucous coat is elevated in the form of a fleshy lip. If the section be transverse, the lip is broad and bulbous, and acquires tumefaction and redness from the contraction of the circular fibres behind it, which produces, relatively to the everted portion, the appearance of a cervix. If the incision be according to the length of the cylinder, the lip is narrow, and the contraction of the adjacent longitudinal fibres, resisting that of the circular fibres, gives the orifice an oval form. This eversion and contraction are produced by that series of motions, which constitutes the peristaltic action of the intestines." (*Travers on Injuries of the Intestines, p.* 85.)

According to this gentleman, some of these appearances were described by Haller, in *Element. Physiol. lib.* 24, *sect.* 2; *and Opera Minora, T.* 1, *sect.* 15.

Having witnessed the facility, with which considerable injuries of the intestinal tube were repaired, Mr. Travers was desirous of ascertaining more fully the powers of nature in the process of spontaneous reparation, and of determining, under how great a degree of injury it would commence, as well as the mode of its accomplishment. For these purposes, he divided the small intestine of several dogs as far as the mesentery. All these animals died, in consequence of the intestinal matter being extravasated, if they had been lately fed, or if they had been fasting in consequence of inflammation, attended with a separation of the ends of the divided bowel, eversion of the mucous coat, and obliteration of the cavity, partly by this eversion, and partly by a plug of coagulated chyle.

In one particular instance, in which Mr. Travers made a division of the bowel, half through its diameter, a sort of pouch was formed round the injured intestine. "A pouch, resembling somewhat the diverticulum in these animals, was formed opposite to the external wound, on the side of the parietes, by the lining peritoneum, on the other side, by the mesentery of the injured intestine, that intestine itself, and an adjacent fold, which had contracted with it a close adhesion. The pouch, thus formed and insulated, included the opposed sections of the gut, and had received its contents, &c. The tube, at the orifices, was narrowed by the half eversion, but offered no impediment to the passage of fluids." (*P.* 96.) Whether, under these circumstances, the functions of the alimentary canal could have been continued, Mr. Travers professes himself incapable of deciding. Among the inferences, which this gentleman has drawn from the experiments, detailed in his publication, the tendency of the two portions of a divided bowel to recede from each other, instead of coalescing to repair the injury, merits notice, inasmuch as it tends to show, that the only means of spontaneous reparation consist in the formation of an adventitious canal, by the encircling bowels and their appendages. The everted mucous coat, which is the part opposed to the surrounding peritoneum, is also indisposed to the adhesive inflammation.

When, however, the wound of the intestine is smaller, the obstacles to reparation are not absolutely insurmountable. Here, retraction is prevented, and the processes of eversion and contraction modified by the limited extent of the injury. If, therefore, the adhesive inflammation unite the contiguous surfaces, effusion will be prevented, and the animal escape immediate destruction. But, union can only take place through the medium of the surrounding parts.

According to Mr. Travers, it is the retraction, immediately following the wound, that is a chief obstacle to the reparation of the injury; for, if the division be performed in such a way as to prevent retraction, the canal will be restored in so short a time, as but slightly to interrupt the digestive function. In confirmation of this statement, a ligature was tightly applied round the duodenum of a dog, which became ill, but entirely recovered, and was killed. "A ligature, fastened around the intestine, divides the interior coats of the gut, in this effect resembling the operation of a ligature upon an artery. The peritoneal tunic alone maintains its integrity. The inflammation, which the ligature induces on either side of it, is terminated by the deposition of a coat of lymph, which is exterior to the ligature, and quickly becomes organized. When the ligature, thus enclosed, is liberated by the ulcerative process, it falls of necessity into the canal, and passes off with its contents." (*P.* 103, 104.)

It appears also from Mr. Travers's experiments and observations, that longitudinal wounds of the bowels are more easily repaired, than such as are transverse. In a dog, a longitudinal wound, of the extent of an inch and a half, was repaired by the adhesive inflammation. Here the process of eversion is very limited; the aperture bears a smaller proportion to the cylinder of the bowel; and the entire longitudinal fibres resist the action of the circular, which are divided, and can now only slightly lessen the area of the canal. (*P.* 108.)

We come now to the consideration of the treatment of wounds of the intestines; a subject, in which much difference of opinion has prevailed; principally, however, concerning the circumstances in which sutures are necessary, and the most advantageous way of applying them.

When the wounded bowel lies within the cavity of the abdomen, no surgeon of the present day would have the rashness to think of attempting to expose the injured intestine, for the purpose of sewing up the breach of continuity in it. In fact, the surgeon seldom knows at first what has happened; and when the nature of the case is afterward manifested, by the discharge of blood per anum, an extravasation of intestinal matter, &c. it would be impossible to get at the injured part of the bowel, not only because its exact situation is unknown, but more particularly on account of the adhesions, which are always formed with surprising rapidity. But, even if the surgeon knew to a certainty, in the first instance, that one of the bowels was wounded, and the precise situation of the injury, no suture could be applied, without considerably enlarging the external wound, drawing the wounded intestine out of the cavity of the abdomen, and handling and disturbing all the adjacent viscera. Nothing would be more likely, than such proceedings, to render the accident, which may originally be curable, unavoidably fatal. I entirely agree upon this point with Mr. John Bell, who says, "When there is a wounded intestine, which we are warned of only by the passing out of the feces, we must not pretend to search for it, nor put in our finger, nor expect to sew it to the wound; but we may trust that the universal pressure, which prevents great effusion of blood, and collects the blood into one place, that very pressure, which always causes the wounded bowel and no other to protrude, will make the two wounds, the outward wound and the inward wound of the intestine, opposite each other, point to point; and if all be kept there quiet, though but for one day, so likely is the tendency to inflame, that the adhesion will be begun, which is to save the patient's life." (*Discourses on Wounds, p.* 361, *Edit.* 3.)

When the extravasation, and other symptoms, a few days after the accident, show the nature of the case, a suture can be of no use whatever, as the adhesive inflammation has already fixed the part in its situation, and the space in which the extravasation lies is completely separated from the general cavity of the abdomen by the surrounding adhesions.

When the bowel does not protrude, and the opening in it is situated closely behind the wound in the peritoneum, a suture is not requisite; for the contents of the gut not passing onward, will be discharged from the outer wound, and not be diffused among the viscera, if care be taken to keep the external wound open. There is no danger of the wounded bowel changing its situation, and becoming distant from the wound in the peritoneum, for the situation which it now occupies is its natural one. Nothing but violent motion or exertions could cause so unfavourable an occurrence, and these should always be avoided. The adhesions, which take place in the course of a day or two, at length render it impossible for the bowel to shift its situation.

Things, however, are far different when the wounded part of the bowel happens to protrude. Here we have the authority of all writers in sanction of the employment of a suture. No enlargement of the outer wound is requisite to enable the practitioner to adopt such practice; there is no disturbance of the adjacent parts; there is no doubt concerning the actual existence of the injury; no difficulty in immediately finding out its situation.

But, though authors are so generally agreed about the propriety of using a suture in the case of a wounded and protruded bowel, they differ exceedingly both as to the right object of the method, and the most advantageous mode of sewing the injured part of the intestine. Some have little apprehension of extravasation, advise only one stitch to be made, and use the ligature chiefly with a view of confining the injured bowel near the external wound, so that in the event of an extravasation the effused matter may find its way outward. Other writers wish to remove the possibility of extravasation, by applying numerous stitches, and attach little importance to the plan of using the ligature principally for the purpose of keeping the intestine near the superficial wound.

When the wound of a bowel is so small that it is closed by the protrusion of the villous coat, the application of a suture must evidently be altogether needless; and since the ligature would not fail to cause irritation, as an extraneous substance, the employment of it ought unquestionably to be dispensed with.

Supposing, however, the breach in the intestine ~~to be~~ small, yet sufficient to let the feces escape, what method ought to be adopted? The following practice seems rational. As Sir Astley Cooper was operating on a strangulated hernia, at Guy's Hospital, an aperture giving issue to the intestinal contents was discovered in a portion of the sound bowel, just when the part was about to be reduced. The operator, including the aperture in his forceps, caused a fine silk ligature to be carried beneath the point of the instrument, firmly tied upon the gut, and the ends cut off close to the intestine. The part was then replaced, and the patient did well. Mr. Travers, who has related this fact, approves of the plan of cutting away the extremities of the ligature, instead of leaving them hanging out of the external wound. It appears, that, when the first practice is followed, the remnant always makes its way into the intestine, and is discharged with the stools without any inconvenience. But when the long ends are drawn through the outer wound, and left in it, they materially retard the process of healing. (*On Injuries of the Intestines, &c. p.* 112, 113.)

Let us now inquire what ought to be the conduct of a surgeon, should he be called to a patient, whose bowel is divided through its whole cylinder, and protruded out of the external wound.

Various have been the schemes and proposals for the treatment of this sort of accident; and since experience has furnished few practitioners with an opportunity of seeing such a case in the human subject, a variety of experiments have been made on animals, in order to determine what treatment would be the most successful. Ramdohr, indeed, is stated by Moebius to have had occasion to try on the human subject a plan, of which a vast deal has been said and written. He cut off a large part of a mortified intestine, and joined the two sound ends together, by inserting the upper within the lower one, and fixing them in this position with a suture, the ligature being also employed to keep them at the same time near the external wound. The patient recovered, and the feces continued to pass entirely by the rectum in the natural way. (See *Halleri Disput. Anat. Vol.* 6, *Obs. Med. Miscellan.* 18.)

About a year after the operation, the patient died, when the anatomical preparation of the parts was sent to Ramdohr by Heister. They were preserved in spirits of wine, and exhibited, according to the latter author, an union of the two ends of the bowel together, and *their consolidation with a part of the abdomen.* Now it has been questioned by a late writer, whether the union here spoken of ever really happened. When the upper end of the bowel is introduced into the lower, the external surface of the former is put in contact with the inner one of the latter; a serous membrane is placed in contact with a mucous one. These heterogeneous structures, he alleges, are not disposed to unite. The mucous membrane, when inflamed, more readily secretes a kind of mucus, which would be an invincible obstacle to adhesion. He thinks it therefore more than probable, that, in the case related by Heister, the invagination was maintained by the union of the intestine with the corresponding part of the abdominal parietes. Several experiments on living animals have convinced him that this happens, and that the mucous membrane will not unite with the external peritoneal coat. This impossibility of producing an immediate union between the mucous and serous membranes may of course be urged as an objection to Ramdohr's practice. (*Richerand, Nosographie Chir. T.* 3, *p.* 344, 345, *Edit.* 4.) Another equally strong objection is, that the upper end of the bowel cannot be put into the lower one, unless it be separated from a part of the mesentery. Here the division of the mesenteric arteries may cause a dangerous bleeding. In vain did Boyer tie seven or eight of these vessels: his patient died with an extravasation in the abdomen. (*Richerand, T* 3, *p.* 343, *Edit.* 4.)

Moebius attempted to repeat Ramdohr's operation upon a dog; but he could not succeed in insinuating the upper part of the divided bowel into the lower one, on account of the contraction of the two ends of the intestinal tube, and the smallness of the canal. Moebius, therefore, was obliged to be content with merely bringing the ends of the bowel together with a suture: the animal soon afterward died of an extravasation of the feces.

Dr. Smith, of Philadelphia, also tried to repeat Ramdohr's method, but could not succeed. He divided the intestine of a dog transversely, and having inserted a piece of candle into that portion of the bowel, which was supposed to be uppermost, he endeavoured to introduce the superior within the inferior; but the ends became so inverted, that it was found utterly impossible to succeed. The scheme was therefore given up, and only one stitch made, the ligature being then attached to the external wound, in the manner advised by Mr. John Bell. The dog died, and on examination there was found a considerable quantity of feces and water in the abdominal cavity.

Two more trials were made of Mr. John Bell's plan, by Dr. Smith, on the intestines of dogs. In both instances the animals died, the intestines being much inflamed, and feces effused in the abdomen. (See *Dr. Smith's Thesis.*)

Mr. Travers likewise tried the same experiment. "I divided the small intestine of a dog, which had been for some hours fasting, and carried a fine stitch through the everted edges, at the point opposite to their connexion with the mesentery. The gut was then allowed to slip back, and the wound was closed. The animal survived only a few hours. *Examination.* The peritoneum appeared highly inflamed. Adhesions were formed among the neighbouring folds, and lymph was deposited in masses upon the sides of the wounded gut. This presented two large circular orifices. Among the viscera were found a quantity of bilious fluid, and some extraneous substances, and a worm was depending from one of the apertures. By the artificial connexion of the edges in a single point of their circumference, and their natural connexion at the mesentery, they could recede only in the intervals, and here they had receded to the utmost." In another experiment, Mr. Travers increased the number of points of contact, by placing three single stitches upon a divided intestine, cutting away the threads, and returning the gut. The animal died on the second day. *Examination.* Similar marks of inflammation presented themselves. The omentum was partially wrapped about the wound; but one of the spaces between the sutures was uncovered, and from this the intestinal fluids had escaped. On cautiously raising the adhering omentum, the remaining stitches came into view. Here again the retraction was considerable, and the intervening elliptical aperture proportionally large. On the side, next to the peritoneum, however, the edges were in contact and adhered, so as to unite the sections at an angle.

From such experiments, the conclusion drawn by Mr. Travers is, that apposition at a point or points, is, as respects effusion, more disadvantageous than no apposition at all; for it admits of retraction and prevents contraction, so that each stitch becomes the extremity of an aperture, the area of which is determined by the distance of the stitches. (*P.* 116, 119.) This gentleman therefore maintains, *that the absolute contact of the everted surfaces of a divided intestine, in their entire circumference, is requisite to secure the animal from the danger of abdominal effusion.* (*P.* 121.) The species of suture employed (says Mr. Travers) is of secondary importance, if it secures this contact. (*P.* 134.) And among other observations, I find " wounds amounting to a *direct* division of the canal are irreparable, and therefore invariably fatal." (*P.* 133.)

These inferences do not appear to me satisfactorily established. We are told, that apposition at a point or points is, as respects effusion, more disadvantageous than no apposition at all, and that the absolute contact of the divided surfaces, in their entire circumference, is requisite to secure the animal from the danger of abdominal effusion. The foundation of these unqualified conclusions is five experiments made on dogs, in four of which experiments the divided bowel was brought together with one stitch, on Mr. John Bell's plan, while in another three stitches were made; and yet, in all these instances, the animals died with the contents of the bowels effused. So far the inferences seem established. Unfortunately for their stability, however, Mr. Travers immediately afterward proceeds to relate other experiments, instituted by Sir Astley Cooper, Dr. Thomson, and Dr. Smith, which, though Mr. Travers seems unaware of the fact, tend most completely to overturn the conclusions, which he had been previously making.

" Sir A. Cooper repeated the experiments of Duverger, who had succeeded in uniting by suture, the divided intestine of a dog, including in it a portion of the trachea of a calf. In place of the uninterrupted suture, three distinct stitches were inserted. On the sixteenth day the animal was killed, and the union was complete." (*P.* 123.)

Here are two facts, proving that a wounded intestine may be united, though the suture was not such as to maintain the divided surfaces in contact, in the whole of their circumference.

Sir Astley Cooper then made the experiment, without including the foreign substance. The animal recovered, being a third fact, tending to prove, that the absolute contact of every point of the ends of the divided bowel is not essential to the cure. (See *A. Cooper on Inguinal and Congenital Hernia, Chap.* 2.)

After dividing the small intestine of a dog, Dr. John Thomson, of Edinburgh, applied five interrupted stitches, at equal intervals, the ends of the ligatures were cut off, and the external wound was closed with a suture. This animal did not die of the operation, and when he was afterward killed, it appeared that the threads had made their way into the interior of the intestinal canal. Dr. Thomson repeated this experiment, and did not kill the animal till six weeks afterward, when the same tendency of ligatures to pass into the bowels, and be thus discharged, was exemplified.

These two last cases make five, in proof that the absolute contact of every part of the ends of a divided bowel is not essential to prevent effusion, or the consequences of the wound from proving fatal; and several other experiments were made by Dr. Smith, of Philadelphia, who employed four stitches with similar success.

As far then as the majority of such facts ought to have weight, we are bound to receive the conclusions of Mr. Travers as incorrect, and unestablished. I am only surprised, that Mr. Travers himself, who has cited the particulars of all these last experiments, did not perceive, that they struck directly at his own inferences. They are not only irresistible arguments against Mr. Travers's conclusion, that the union of a divided bowel requires the contact of the cut extremities in their entire circumference; but they are a plain denial of another position advanced by this author, viz. that wounds amounting to a direct division of the canal, are irreparable, and, therefore, invariably fatal.

With respect to the species of suture being of secondary importance, provided it secure the complete contact of every part of the everted ends of the divided bowel, I regret, that Mr. Travers has omitted to institute experiments, in order to show that any such suture can be practised, and if he has the ingenuity to apply it, whether the result would be for or against the conclusions, which he has formed. The fact of the sutures always making their way into the cavity of the bowel, and being thus got rid of, appears to me highly interesting, since it shows the safety of cutting away the ends instead of leaving them hanging out of the external wound, so as to create the usual irritation and inconveniences of extraneous substances. It seems that Mr. Benjamin Bell first recommended cutting the ends of the ligatures away, and reducing the bowel in this state into the abdomen, as, he says, a considerable part of the remainder of the ligature will fall into the cavity of the gut. (*System of Surgery, Vol. 2, p.* 128, *edit.* 7.) We have seen that the experiments of Dr. Thomson confirm the observation, and those instituted by Mr. Travers, tend to the same conclusion.

According to the latter writer, the following is the process, by which a divided intestine is healed, when sutures are employed. "It commences with the agglutination of the contiguous mucous surfaces, probably by the exudation of a fluid, similar to that which glues together the sides of a recent flesh wound, when supported in contact. The adhesive inflammation supervenes, and binds down the everted edges of the peritoneal coat, from the whole circumference of which a layer of coagulable lymph is effused, so as to envelope the wounded bowel. The action of the longitudinal fibres, being opposed to the artificial connexion, the sections mutually recede, as the sutures loosen by the process of ulcerative absorption. During this time, the lymph deposited becomes organized, by which further retraction is prevented, and the original cylinder, with the threads attached to it, is encompassed by the new tunic.

"The gut ulcerates at the points of the ligatures, and these fall into its canal. The fissures left by the ligatures, are gradually healed up; but the opposed villous surfaces, so far as my observation goes, neither adhere, nor become consolidated by granulation, so that the interstice, making the division internally, is probably never obliterated." (*Travers on Injuries of the Intestines, &c. p.* 128.)

Notwithstanding I have carefully read all the arguments adduced by Mr. Travers in favour of stitching a divided bowel at as many points as possible, I still remain unconvinced of the advantage of such practice, for reasons already suggested. If a case were to present itself to me, in which a bowel, partly cut through, protruded, I should apply only a single suture, made with a small sewing-needle, and a piece of fine silk. If the bowel were completely cut across, I should have no objection to attach its ends together by means of two or three stitches of the same kind. I coincide with Mr. Travers, respecting the advantage of cutting off the ends of the ligature, instead of leaving them in the wound, as I believe he is right, in regard to the little chance there is of the injured intestine receding far from the wound, and if the ends of the ligature are then of no use in keeping the bowel in this position, they must be objectionable, as extraneous substances.

As confirming some of the foregoing observations, I would refer to the valuable writings of Scarpa, and those of Dr. Hennen. The parts of the former, to which I allude, being contained in the last edition of the First Lines of Surgery, need not here be repeated. "The older practitioners, (says Dr. Hennen,) were very much averse from leaving any thing to nature in cases of abdominal injuries, although their universal employment of sutures ought to have convinced them, how much she could bear with impunity; for there can be very little doubt, that their uniform performance of the operation of gastroraphe was at least superfluous, if not positively hurtful. In the course of a very extensive practice, two cases only have come under my notice, where it was required to a wounded intestine, though frequently it may be needed for injuries to the parietes." (*On Military Surg. ed.* 2, *p.* 411.)

When the protruded intestine is mortified, which must be a very rare occurrence in cases of wounds, the treatment should be the same as that of a mortified enterocele. (See *Hernia.*)

As Dr. Hennen observes, in the treatment of wounds of the abdomen, the violence of sypmtoms is to be combated more by general means, than by any of the mechanical aids of surgery. The search for extraneous bodies, unless superficially situated, or they can be felt with a probe, is entirely out of the question. "Enlargement, or contraction of the wound, as the case may require, for returning protruded intestine, securing the intestine itself, and promoting the adhesion of the parts, is all that the surgeon must do in the way of operation; and even in this, the less he interferes the better." (*On Military Surgery, ed.* 2, *p.* 401.)

The principal indication is to prevent a dangerous degree of inflammation. Hence bleeding and the antiphlogistic treatment are highly indispensable. Let not the surgeon be deterred from such practice by the apparent debility of the patient, his small concentrated pulse, and the coldness of his extremities, symptoms common in acute inflammation of the bowels, and, in fact, themselves, indicating the propriety of repeated venesection. Wounds of the small intestines are attended with more dangerous symptoms than those of the large ones. All flatulent, stimulating, and solid food, is to be prohibited. The bowels are to be daily emptied with glysters, by which means, no matter will be suffered to accumulate in the intestinal canal, so as to create irritation and distention.

When excrementitious matter is discharged from the outer wound, it is highly necessary to clean and dress the part very frequently. Gentle pressure should also be made with the fingers, at the circumference of the wound, at each time of applying the dressings, for the purpose of promoting the escape of any extravasated matter. For the same reason, the patient should always lie, if convenient, in a posture that will render the external opening depending.

After a day or two, the surgeon need not be afraid of letting the outward wound heal up; for the adhesive inflammation, all around the course of the wound, will now prevent any extravasated matter from becoming diffused among the viscera. If the case should end well, the intestine generally undergoes a diminution in its diameter at the place where the wound was situated. When this contraction is considerable, the patient occasionally experiences colic pains at the part, especially after eating such food as tends to produce flatulence. As these pains usually go entirely off after a certain time, and no inconvenience whatsoever remains, the intestine may possibly regain its wonted capacity again. A more considerable constriction of the above sort has been known to occasion a fatal miserere. Even the intestine itself has been known to burst in this situation, after its contents had accumulated behind the contracted part. Patients who have recovered from wounds in the intestines, should ever afterward be particularly careful not to swallow any hard substances, or indigestible flatulent food. On this subject the writings of Scarpa are particularly interesting.

In some instances, intestinal matter continues to be discharged from the outer wound, either in part, or entirely, so that either a fistula, or an artificial anus, is the consequence. A fistula is more apt to follow, when an intestine has been injured by a ball, has been quite cut through, or has mortified. But numerous cases prove, that this is not invariably the consequence, and that a perfect cure has frequently followed each of these occurrences. (See *Anus, Artificial.*)

When an intestine is completely cut through, and the lower portion of the canal lies inaccessibly concealed in the abdomen, writers insist upon the necessity of promoting the formation of an artificial anus. In this particular case, they recommend fixing the extremity of the intestine with a fine suture, to the edges of the outer wound. In order to distinguish the upper end of the intestine from the lower, the proposal is sometimes made to give the patient a little milk, and to observe whether the fluid, after a time, issues from the mouth of the protruded gut. In the mean while fomentations are employed. If the upper end of the intestine be in the abdomen, these speculative authors even deem it justifiable, when the accident is quite recent, to dilate the outer wound, search for the hidden continuation of the bowel, and then sew the two ends together.

Practical surgeons, I believe, are right in attaching little value to such directions. "Indeed, (says a modern writer,) the surgical world have long since dismissed their fears about the intestine falling inwards, and about the difficulties of distinguishing between the right and the wrong end of it. The apprehensions of abdominal effusions are now all pretty well subdued. The occurrence is extremely rare, and when it does happen, we leave the poor wretch to die in peace, without searching after effused fluids, the nature of which cannot be known, or if known, the information cannot in the most remote degree lead to recovery. I have never witnessed a case where any possible good effects could follow the paracentesis; for peritonitis, in its most exquisite form, has always preceded the symptoms which would lead to the performance of that operation." (*Hennen on Military Surgery, Ed.* 2, *p.* 411.)

In some instances, musket-balls pass into the abdomen, lodge there a considerable time, and are then voided through the intestinal canal; while, in other examples, they become encysted, and continue lodged the rest of the patient's life, without producing much, or, indeed, any inconvenience.

Contusions and other Injuries of the Abdomen.—A violent contusion of the abdomen may injure the contained viscera, without the occurrence of any external wound. It was in this way, that the liver or gall-bladder was ruptured in the boy mentioned by Mr. Fryer, (*Med. Chir. Trans. Vol.* 4;) and that the vena cava was lacerated in the case which fell under the observation of Richerand, where a cart-wheel passed over child's belly. (*Nosographie Chir. T.* 3, *p.* 353.) In other instances, the mischief is done to the intestines; and still more frequently, the viscera, as well as the parietes of the abdomen, have only suffered a more or less forcible contusion. The effects of such violence, are inflammation of the injured bowels, and their adhesion to the inside of the peritoneum. Thus the stomach and intestines, the liver, and the gall-bladder, when inflamed from a blow upon the front of the belly, contract adhesions to the corresponding portion of the parietes, which has been also bruised, and is itself inflamed. When such inflammations suppurate, (and, according to Richerand, it is their most usual course,) on opening the abscess, the pus is found blended with the matter, which the viscera contain or secrete. Thus the alimentary matter, and even intestinal worms have been discharged with the pus on opening certain abscesses, which communicated with the cavity of the stomach or bowels; and bile has been found blended with the matter of abscesses in the right hypochondrium.

When in consequence of a blow upon the anterior part of the belly, the patient experiences in the situation of the injury a deeply-seated pain; when a tumour forms, and the symptoms indicate violence done to some of the adjacent viscera; the inflammation is to be opposed by every possible antiphlogistic means. But when, notwithstanding such treatment, the swelling increases and suppurates, the abscess is not to be opened until it is perfectly mature. The inflammatory symptoms, which preceded its formation, indicate that there is an adhesion between the injured organ and the parietes of the abdomen. Without this adhesion, opening the abscess would be attended with more risk, because the pus, or other matter, might become extravasated in the cavity of the peritoneum. For the same reason, in the examples of tumours, caused by bile in the gall bladder, J. L. Petit recommends deferring the operation of opening them, until the inflammatory symptoms evince, that an adhesion has taken place between the fundus of the gall bladder, and the corresponding point of the parietes of the abdomen.

An adhesion of the abdominal viscera to the inner surface of the peritoneum may be induced by other causes, besides the action of contusing bodies. A knife, a fork, a shoemaker's awl, a needle. and other extraneous substances incapable of passing throughout the alimentary canal, have been known to irritate the stomach, or bowel, and to bring on adhesion of them to the parietes of the abdomen, where a tumour has formed, which, on being opened, has discharged the foreign body. The records of surgery abound in facts of this kind. A fistula succeeds the opening of the abscess; the alimentary matter escapes; and if the aperture admit not of being healed by methodical compression, the intestinal canal between the fistula and the anus contracts; most of the contents of the bowels pass out at the preternatural opening, and the patient falls into a state of marasmus, the more quickly fatal, the nearer the injury of the intestinal canal is to the stomach.

A long-continued pressure on the epigastric region may cause an adhesion of the stomach to the peritoneum, and suppuration taking place at the part, a fistula, communicating with the cavity of that organ, may be formed, and allow the victuals to escape externally. (See *Richerand, Physiologie, T.* 1. *Chymification : Nosographie Chirurg. T.* 3, *p.* 353—356, *Ed.* 4.)

I shall conclude, with repeating, that in the generality of injuries of the abdomen from external violence, whether wounds or contusions, the principal danger depends upon inflammation of the peritoneum. In the treatment, therefore, the most necessary thing is to prevent and oppose this perilous affection. Copious and repeated venesection, the application of leeches, mild aperient clysters, a low fluid diet, perfect rest, fomentations, and the warm bath, are among the most effectual antiphlogistic remedies, which, in such cases, are entitled to praise and confidence.

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WRY-NECK. (*Caput Obstipum; Torticollis.*) An involuntary and fixed inclination of the head towards one of the shoulders; a disorder not spoken of by the ancients. It should not be confounded with a mere rheumatic tension and stiffness of the neck, nor with the faulty position of the head, arising from deformity of the cervical vertebræ.

Tulpius, a learned physician at Amsterdam, about the middle of the seventeenth century, has recorded the cure of a boy, twelve years old, who, from his earliest infancy, had had his head drawn down towards the left shoulder, by a contraction of the scalenus muscle. Fomentations were applied in vain. The head could not be brought into the right posture, even with the aid of steel collars. A consultation was therefore held, in which it was decided to put the boy under the care of Minnius, a surgeon who had performed several operations with success in similar cases. A large eschar was first made with caustic; and the muscle, which drew the head to one side, was then divided with a knife. Tulpius, who has left a very confused account of the operation, observes that it was performed with great slowness and circumspection, for fear of wounding the carotid artery and jugular vein. However, he offers one good piece of advice, which is, not to make any preliminary application of caustic, as it only causes useless pain, and cannot be of any service. He also recommends the operation not to be done by little and little, at repeated times; and says, that the surgeon should make a complete division of the muscle at once, with the necessary degree of caution.

Job à Meckren also treats of the operation for the cure of a wry-neck. He states, that he had seen it performed on a boy, fourteen years old. The tendon of the sterno-cleido-mastoideus muscle was skillfully divided with one stroke of a sharp pair of scissors, by a surgeon named Flurianus, and as soon as the incision was made, the head resumed its right position. (*Obs Med. Chir. C.* 33.) Mr. S. Sharp believed, that the wry-neck mostly arose from a contraction of the sterno-cleido-mastoideus muscle, which he proposed the division of, whenever the disorder seemed to proceed from this kind of cause. However, he made an exception of cases, in which the disorder had existed a considerable time, or from infancy. He remarks, that, if the cervical vertebræ have grown in a distorted direction, the position of the head cannot be rectified. With these restrictions, the following is the operation, which he recommends: A transverse incision is to be made through the skin and fat, of a size somewhat more extensive than the breadth of the muscle, and about one third of its length from the clavicle. A probed razor is then to be passed underneath the muscle, and to be drawn out, so as to make the requisite division of the part. After the incision has been made, Mr. Sharp recommends the wound to be filled with dry lint, and to be always dressed in a way best calculated to keep the extremities of the muscle from growing together again. For this purpose, he directs the cut ends to be separated from each other as much as possible, with the assistance of a bandage to support the head, during the whole time of the cure, which, he says, will generally be about a month. (*On the Operations of Surgery, Chap.* 35.)

According to Mr. Sharp's account, this operation ought to be common. However, if attention be paid to the nature and causes of the disease, and to the differences resulting from whether the disorder be recent, or of long standing; constant, or periodical; idiophatic, or sympathetic; dependent on spasm, or merely on paralysis of the antagonist muscles; and, lastly, if it be recollected, that the affection may be produced by other muscles, besides the sterno-cleido-mastoideus; it will appear, that cases, in which the foregoing operation can be judiciously undertaken, are not frequent.

With regard to the manner in which Mr. Sharp operated, Mr. B. Bell conceived, that it was attended with hazard of wounding the large blood-vessels. But, though it seems to me better to use a probe-pointed bistoury and a director, than the kind of razor which Mr. Sharp employed, I do not coincide with Mr. B. Bell in thinking, that the latter surgeon's plan was at all objectionable on the score of danger, in respect to wounding the vessels. Some practitioners may even think Mr. B. Bell's method most likely to injure the large vessels; for he advises the operator to cut the muscle from without gradually inward, as deeply as necessary.

Perhaps, the most prudent method of operating, is to divide the clavicular portion of the contracted muscle, near the clavicle, and even to cut out a sufficient piece, to remove all chance of the two ends uniting again. This step would weaken the muscle considerably, and perhaps, might answer every purpose. It could easily be accomplished, by means of a director, and curved bistoury, after making the requisite division of the skin with a common scalpel. Were this proceeding to produce only partial amendment, the sternal portion of the muscle might afterward be divided. A director should be passed under it, and the division made with a probe-pointed curved knife.

Any cause, destroying the equilibrium between the two sterno-cleido-mastoidei muscles, will produce a wry-neck. Thus, when one of them is affected with spasm, and acts more forcibly than the other, it draws the head towards the shoulder of its own side; but, when one sterno-cleido-mastoideus is paralytic, while the other retains only its natural power, the balance of action is equally destroyed, and the sound muscle inclines the head toward the nearest shoulder. In paralytic cases, electricity, (*Phil. Trans. Vol.* 68, *p.* 97; *Gilby, in London Med. Journ. Vol.* 4, 1790.) blisters, stimulating liniments, the shower bath, sea-bathing, issues, setons, the application of moxa, and attention to the health in general, are the means affording the best chances of relief.

Although the wry-neck may occasionally depend on the state of the sterno-cleido-mastoidei muscles, the case is far from being frequent. The deformity is much oftener owing to some affection of the integuments. Louis often successfully divided contractions of the skin, which had kept the head drawn to one side for many years, and had been occasioned by burns. Some of these contractions, he says, might easily have been mistaken for a part of the sterno-cleido-mastoideus itself.

Mr. Gooch relates a case of wry-neck, which was caused by a contraction of the platysma myoides muscle. The patient was a young gentleman, fourteen years of age, who had always enjoyed very good health in every other respect. For several months, his head had been strongly drawn to one side by a constant contraction of the platysma myoides muscle, which was exceedingly rigid, especially about its insertion at the basis of the jaw, and from the angle of the os maxillare inferius to the chin, the skin presented an appearance like that of the cicatrix of a burn. The same side of the face, quite from the point of the chin, was much shrunk, and distorted by the contraction of the muscle, and the corner of the mouth, in particular, was so drawn to one side and downward, when the patient turned his head, that a vast deal of deformity was the consequence. From the inferior part of the eyebrow, at the internal angle of the eye, to near the top of the head, there was a kind of furrow upon the skin, about half an inch broad, with a shining, polished appearance, like the cicatrix of a wound, and destitute of hair, which had fallen off. From the corner of the eye downwards, there was the same kind of appearance in a less degree. The patient was subject to repeated attacks of spasms, which began at the insertion of the muscle, and terminated at the eye, attended with a great deal of pain. The ear, and also the temporal and frontal muscles, were sometimes affected in a similar manner. The parts, in the course of the insertion of the muscle into the jaw-bone, were considerably thickened, without being in the least inflamed externally, and when touched, but not stretched, they were little painful. The subjacent muscles did not seem at all affected.

It appears from the account given by Mr. Gooch, that in the treatment of this affection, every known means had been tried, by the advice of the most eminent practitioners; but without effect. Mr. Gooch determined to try what benefit would be produced by the division of the muscle. He first divided the integuments a little below the jaw, and thus exposed the whole breadth of the platysma myoides muscle, the fibres of which seemed to be in a state of violent extension, especially when the patient's head was inclined towards the opposite side. Mr. Gooch then divided the muscle completely across by a very careful dissection, until the fasciæ of the subjacent muscles were exposed. The patient was then directed to turn his head towards the opposite side, and Mr. Gooch had the satisfaction of observing that the patient could perform this motion, without the face and corner of the mouth being affected, as they used previously to be. The wound was treated in the ordinary way, and no particular symptoms arose. As soon as the inflammation had subsided, the patient was directed frequently to move his head about in order to prevent any kind of stiffness which might ensue from the contraction of the muscular fibres, and the inelasticity of the cicatrix.

The patient was perfectly relieved by the foregoing operation, and had no return of the painful spasms, to which he had been previously subject. The side of his face, however, never recovered its proper degree of plumpness. (*Chir. Works of B. Gooch, Vol.* 2, *p.* 81.)

Whenever an attempt is made to cure a wry-neck, by dividing any of the muscles, or merely the integuments, it becomes necessary to take some measures for keeping the head in a proper position, during the treatment of the wound, lest, in consequence of the head inclining in the direction in which it was before the operation, the divided parts grow together again, and bring the patient into the same condition, in which he was before any thing had been done. With a view of preventing this unpleasant circumstance, Mr. Sharp recommends filling the wound with lint, and making it suppurate. Mr. B. Bell, on the other hand, advises the employment of a proper machine for keeping the head in a due position. Some writers think the use of a bandage quite sufficient for the purpose. When the sterno-cleido-mastoideus is affected, perhaps the excision of a small portion of it would be prudent.

Boyer met with a case of paralysis of the extensor muscles of the head, attended with a constant approximation of the chin to the sternum. The disease resisted every plan of treatment, and an apparatus for supporting the head was the only thing found of any use. (See *Traité des Mal Chir. T. 7, p. 61, 8vo. Paris,* 1821.) *Sharp's Treatise on the Operations of Surgery, chap. 35. Blasius, Obs. Med. Rar. p. 2, No. 1. Cure effected by operation. Mauchart, De Capite Obstipo, Tub.* 1737. *Chirurgical Works of B. Gooch, Vol. 2, p. 81. B. Bell's System of Surgery. Roonhuysen, Heylcuren, p. 1, No. 22 and 33: successful operation. Encyclopédie Méthodique, Partie Chirurgicale T. 2, Art. Torticollis. Joh. Christ. Gottfr. Jörg. über die Verrkrümmungen des Menschlichen Körpers, und eine rationelle und sichere Heilart derselben; Leipzig,* 1810. *Baron Boyer, Traité des Mal. Chir. T. 7, p. 48, &c., 8vo. Paris,* 1821.

Z.

ZINC. The preparations of this metal are of considerable use in surgery. With respect to the *sulphate of zinc,* it may be said to be generally the best emetic, in cases where it is desirable to empty the stomach without the least delay, as in cases of poison, for which purpose, the common dose is ℈j. "As an external application, this salt dissolved in rose-water, in the proportion of gr. iss to ℥j. of rose-water, forms an excellent collyrium in the latter stage of ophthalmia, after the inflammatory action has subsided; it is a good injection in a similar stage of gonorrhœa; and a lotion in some kinds of superficial inflammations. Of double strength, this solution is the best application that can be used in scrofulous tumours, after they have suppurated, and the abscess been discharged." (*A. T. Thomson, London Dispensatory, Ed. 2, p.* 559.) The *unguentum zinci,* composed of an ounce of the oxide of zinc, and six ounces of prepared lard, is an useful astringent, mildly stimulant application; and is frequently employed in various cases of cutaneous diseases, ringworm, sore nipples, and chronic inflammation of the conjunctiva of the eyelids.

APPENDIX.

HYDROPHOBIA. Our author, after a most laborious research into the annals of surgery, in order to ascertain the pathology of this disease, and without being able to decide upon any of the at present promulgated opinions, is constrained, being in doubt, at length to ask, "*Does the infectious principle of rabies reside in the salivary secretion, or in the mucus of the trachea and bronchia;*" and immediately adds, "*The common belief is, that, in hydrophobia, the salivary glands are considerably affected.*" By this is shown, that, notwithstanding the mystery in which the pathology of this disease is involved, the mind of the inquirer has been led to the site of the salivary organs, to search for a cause which he deleares himself satisfied existed in no other situation.

It is for me now to record a communication from a most respectable physician at St. Petersburg, Dr. Marochetti, handed me by the Honourable S. L. Mitchill, M. D., in the hope that the medical community of this country will exert itself, as frequently as opportunity may offer, either to substantiate the doctrine of the salivary glands being the particular and primary locality of hydrophobia; or disprove the assertion, by an evidence which shall direct the mind to another source.

St. Petersburgh, 17th (29th) Nov. 1821.

Sir—I did myself the honour of enclosing you, about a month since, a manuscript copy of a report read October, 1820, to the Medico-Physical Society of Moscow, by Dr. Michel Marochetti, upon hydrophobic virus, and the means of discovering its presence and destroying its activity in an infected subject. Apprehending that my letter may have miscarried, I trouble you with the duplicate, accompanied by the same memoir in a printed form, which it has received since my first letter.

The art of inoculating for small-pox, and thereby mitigating the violence of the disease, having been first known and practised in the East, encourages a hope that the discovery from the same quarter, of a mode of curing the incipient symptoms of hydrophobia, by a process in some degree analogous, may be the means of rescuing numbers of victims from encountering death in one of its most horrid forms.

Desiring to give a wide circulation to the paper of Dr. Marochetti, in order that our country may have the early benefit of his discovery, I have thought I could not address myself better than to the President of the Medical Society of New-York, who will not fail to give his recommendation so far as it may be merited.

I have the honour to be, Sir, respectfully, your obedient servant,

HENRY MIDDELTON.

Hon. S. L. Mitchill.

Observations on Hydrophobia: containing certain indications for ascertaining the existence of the hydrophobic poison in an individual, and the means of preventing its developement by destroying its germ. In a memorial read before the Medico-Physical Society of Moscow, on the 4th of October, 1820; by Michel Marochetti, Attending Physician at the Gallitzin Hospital, and member of the said Society. Printed in St. Petersburgh, at the Press of Public Instruction, 1821.

Among the fatal accidents to which man is exposed, the hydrophobia, a terrible consequence of the bite of rabid animals, is a disease whose cruelty is aggravated by the insufficiency of all the means hitherto employed to save its victims, and by the acknowledgment of all practical men, that there is no specific against the hydrophobic virus, after absorption has taken place, and the symptoms have appeared. I shall not undertake a refutation of this truth. I shall only say, that, with a knowledge of the cause, it is possible, by means of help duly afforded, to prevent the mischief, and consequently to save from certain death, those persons who, before the discovery which I have the honour to announce, had no chance of safety.

Hitherto, the professors of the healing art have been ignorant of the true seat of the disease. A crowd of remedies have been administered; some because they had doubtlessly been employed *with success* in cases where there was no hydrophobia, and others for the purposes of benevolence and prevention. But a very important point in medicine, and one that has been sought in vain, is the cause of this malady. Its effects are, unfortunately, but too well known. I shall therefore, on this occasion, endeavour to state, 1st, the knowledge I have derived from observation; 2d, the origin of the discovery; and 3d, the different pathological occurrences I have been able to collect, with my own remarks upon them.

Having spent almost eight years of my life in the southern governments of Russia, where there is a great number of dogs, some of them often run mad, and produce frequent accidents. Repeatedly I have endured the distress of beholding the deaths of these victims. I necessarily made inquiries concerning hydrophobia, and tried all the known methods of treating it. Confined to a village in the midst of the wretched creatures, some of whom had been bitten by mad dogs, and others by mad wolves, nobody possessed better opportunities than myself to follow and to watch the course and progress of this horrible disorder.

I now state the conclusions I have drawn from the most scrupulous attention to hydrophobia.

In the first place, I am convinced by experience, that if several persons are bitten in succession by a rabid animal, the first bitten exhibits in the developement of the disease, more serious and violent symptoms than the second, this more than the third, and so on; the poison acting always in an inverse ratio to the numbers, in such a manner that the eighteenth or twentieth person may be considered out of danger. Such a case sometimes happens.

Secondly, the hydrophobic virus does not constantly reside in the mouth of the mad animal.—It gathers there only at the end of a certain time. The bite, in this interval, is not to be considered as venomous. Here is another case in which the rabies is not communicated.

Thirdly, the hydrophobic virus does not lose, like the *pestilential miasma*, any of its intensity in being communicated from one body to another—but it acts with more or less violence in proportion to its quantity. Unfortunately, the effect is not the less fatal, by reason of its quicker or slower operation.

Fourthly, it is evident that this virus does not continue in the wounds; but is conveyed in its full force to a part of the body presently to be described. In this part, it instantly acts as a most powerful *astringent*, and, by accumulation, inflames and shuts the passages, by which nature endeavours to expel it from the animal economy.

Fifthly, there is one, and only one way, to prevent the developement of hydrophobia in a person who is threatened with it. I declare boldly, and experience will bear me out in the assertion, that this is to evacuate the hydrophobic virus when it appears. Where does this reside? and how can it be evacuated?

Sixthly, the sub-lingual glands are two in number, one on each side, under the tongue, between the genio-glossi muscles, the lower jaw, and the inner membrane of the mouth, which immediately covers them. From these glands proceed two or three secretory ducts, which open into the ducts of the sub-maxillary glands, and those latter open one on the one side, and the other on the other side of the frænum of the tongue—it is precisely to the extremities of these ducts, that the hydrophobic virus is conveyed after a bite inflicted by a rabid animal, and there it is *temporarily* detained, forming, at the two spots just described, one or two small tumours of unequal size. By touching, which may be done with a probe, it is found that there is contained a fluctuating humour, which is, as absorption proves, the hydrophobic poison itself. It is there that nature delivers to us her enemy. It is from this hold that the surgeon ought to expel him.

Seventhly, the time cannot be exactly defined at which these small tumours will show themselves. If the virus is not evacuated in twenty-four hours it disappears by *re-absorption*. Then no trace is left of its pre-existence. There takes place a double metastasis towards the brain. The most frightful symptoms of hydrophobia commence, and the patient sinks under one of its paroxysms.—On opening the body, nothing remarkable is observed; pathological anatomy, after all its explorations, has not discovered any indication capable of fixing the attention of physicians, and of rendering an explanation of the causes, because they did not understand the *re-absorption* of this virus.

Eighthly, the first thing to be observed when a person believes he has been bitten by a mad animal, is the lower side of the tongue, which ought to be examined for six weeks, once, or even twice a day, for more perfect precaution. If at the end of this term there is no appearance of the small swellings already described, we may rest assured that the individual is not to be infected with hydrophobic virus. During these examinations, if the tumours appear, they must be instantly *cauterized*, or, what is better, opened with a small, sharp lancet. This operation is performed by raising the tongue with one hand, covered with a suitable cloth, towards the palate, and somewhat side ways, to the end that the small buttons or tumours may be easily touched. For greater convenience the tongue ought to be supported by an assistant; so that there may be made as many longitudinal incisions as there are lumps. From these latter there will proceed some drops of a *sanious* lymph, somewhat *greenish*, which, the patient operated upon, will spit out. As soon as the operation is over, the patient must wash his mouth with a strong decoction of the *tops* and *flowers* of the *Genista lateo-tinctoria*, (Dya's Broom.) It is almost superfluous to observe, that this decoction must be prepared in advance, for it must be regularly taken during the six weeks that the patient is under examination, as a common drink. The dose is a pound and a half per day, in decoction; or four drachms a day in powder, in doses of one drachm each. The prescriber, however, will always take into consideration the age and constitution of the patient.

Ninthly, I observe that the operation which consists in opening the small tumours, has the great advantage of being so simple, and so easy to execute, that not only professional men, but every individual who has seen it performed two or three times, can perform it himself. This is very important for the small towns and villages, where, as yet, there are no settled and established surgeons. I offer myself, on the occurrence of the first accident of this kind, to perform the operation in the presence of any person whom the government may be pleased to appoint.

I inhabited the Ukraine, during 1813, in the capacity of physician to his excellency the count Morzezensky. In one of his villages, called Kijawka, during an evening of the autumn, at the hour when the peasants return home from their labour, a huge hydrophobic dog of a neighbouring village, bit fifteen persons of different ages and sexes. As I lived at the distance of five versts, I received no intelligence until the next morning. Proceeding then with all possible speed to the place, I procured for these unfortunate persons a house, spacious enough to contain them all, and I placed near them attendants to nurse and attend them.

While these arrangements were making, a deputation of old men waited upon me, praying that the bitten persons might be treated by a Peasant of the neighbourhood, who had for a number of years made a business of attending such cases, and with constant success. They all assured me they would bear witness in favour of this man, who, according to their declaration, had already served several hundred persons in that government.

I had previously heard of this man. I was desirous of satisfying myself as to the efficacy of a means so very important to humanity, and of which I had wished to have an opportunity to become an eyewitness. Leave was obtained from the master of the village; and my permission was additionally granted, that the peasant should take charge of the patients. I however imposed two conditions; the first of which was, that I should be present at every thing he did; and the second, that to be sure that the dog that had bitten them was really mad, and hydrophobic, I should practise upon one of the patients in my own way. I selected from among them a girl, six years old, whom I subjected to medical treatment. The others began to take the decoction of the *genista lateo-tinctoria*, which the peasant prepared in my presence.

As I passed the greater part of my time near these unfortunate persons, I administered my own remedies for the girl I had taken for my own patient. I had engaged a surgeon, with orders not to let the peasant do any thing in my absence. This plain man began by examining the tongue of each individual, one after the other, on its lower part, or under side, every morning and evening. As the tumours appeared, he showed them to me; and he opened them, and cauterized them with a sort of large needle, heated red hot in the candle. After the operation, he caused them to rinse their mouths with the same decoction which has been mentioned for internal use.

The girl of six years old, whose treatment had been continued with the greatest care, and conformably to the rules of established practice, became the victim of the experiment! for, on the morning of the seventh day after the bite, she was suddenly seized with symptoms of hydrophobia, and at the end of eight hours expired in my presence, during a paroxysm of the most frightful symptoms.

Of the fourteen remaining persons, twelve underwent the operation of opening their tumours, and were saved. The two others, who had been bitten last, had no tumours. These fourteen persons, after having for six weeks made use of the decoction of *Genista*, were discharged cured.

Having remained there more than three years after this occurrence, I saw, a number of times, all the individuals, and can attest that their recovery was complete.

I state more facts. Being in Podolia during 1818, I resided in a small town called Meskowka, within the district of Olgapal. In the month of February, twenty-six persons, partly Christians and partly Jews, of different ages and sexes, were bitten by a hydrophobic dog. This dog made incursions into the town, and having bitten all the persons he met, had disappeared. The inhabitants, however, rallied; and in their search for him, in the place of his usual retreat, found him dead near a heap of wheat.

Though I took great pains to ascertain the successive order of the bites, I was unable to determine the exact series in these twenty-six individuals.

So considerable a number of the bitten and calamitous beings could not be accommodated in any house that could be procured. I was therefore obliged to separate them into three divisions; and send each division to a distinct house. I attached to the first division, nine men; to the second, eleven women; and to the third, six children. In each of the houses I stationed a Hebrew surgeon, to prepare the decoction of the *Genista lateo-tinctoria*, to administer it to them regularly, and to report to me every thing that happened.

The result was, that, in the first division, five persons had swellings under the tongue; in the second, all had them; and in the third, only three of the children.

Among these individuals, they who had the deepest and most numerous wounds, experienced the tumours on the third day. The rest on the fifth, seventh, and ninth days. In one woman, these sub lingual swellings did not manifest themselves until the twenty-first day after the bite. This woman had received a slight bite in the right leg.

The seven persons who had no tumours nevertheless drank the decoction for six weeks, and were then set at liberty with the rest, excepting those whose wounds were not healed. They remained in charge until their entire restoration to health. I have employed, as an excellent detergent, the residue of the decoction of the herb *Genista*, as an application to the wounds, in the form of a poultice.

It is not unfrequently necessary, to give a gentle purgative, once a week, or at least a simple clyster prepared from a decoction of the marsh-mallows of the shops, in which a small quantity of *Astrakan salt* is dissolved. By either of these means, costiveness is prevented.

There is a matter which merits the greatest attention This is the succession of forerunning symptoms, observable during the formation of the small pustules, whose discovery is the offspring of a most lucky observation. Towards that stage, the pupil of the eye is dilated and fixed; the look is sad; uneasiness is complained of; and there is a small pain in the head. These are the only symptoms I have been able to detect. The simple and easy method of treating persons threatened with hydrophobia, is that which has been practised upon about forty individuals with complete success. The little girl, who fell a sacrifice to my experiment, affords a piece of evidence quite as strong. Henceforward a regimen can be adopted, of which I will warrant the salutary result.

By way of conclusion, I remark, that at different times and places, I have treated six persons in the same manner; among others, a peasant who had been bitten by a mad wolf, as he was going from one village to another. His cries brought other men, who assisted in killing the ferocious beast, who had been already marked as hydrophobic. The only difference between this and the radical cure, was, that this man, among other wounds, had been bitten on the forepart of the ankle; and that the tendons and ligaments were so lacerated, that all the surgical means which were applied, could not prevent a great deformity of the foot. He was confined to his bed for two months.

After the disclosures I have made concerning the hydrophobic virus, I consider the disease as a *local evil*, of which it is possible to prevent the consequences, by a seasonable removal of the morbific matter. For after the reabsorption has been made, there are no means of arresting its terrific effects. I think it may be thence concluded, that the known symptoms of hydrophobia, such as constriction of the breast, violent pain in the head, dilatation of the pupil, occasional palsy of the tongue, convulsions, dread of liquids, all nervous symptoms, are produced by the *reabsorption* of the hydrophobic poison. The nerves from the fifth pair, those which go to the tongue, the intercostal and corvical nerves, furnish direct evidence of the manner in which the virus exerts its deleterious action through the medium of the nerves leading from the sublingual and submaxillary glands. Without taking into consideration the complicated distribution of these nerves, their connexions and sympathies, I entertain the hope, that Physiology will, one day, give us more satisfactory details on this subject. It only remains for me, gentlemen, to state my sole and particular desire for the publication of a memoir, useful to humanity, and the chief object of my researches and of my exertions.

Accept, respectable president, and members, who have had the goodness to receive me as a colleague and fellow-labourer, the observations which I offer you, in the most philanthropic spirit; add thereto your own intelligence, and aid me with your practical experience. I shall be overjoyed if I should be happy enough to limit the disasters caused by hydrophobia.

(Signed) MAROCHETTI.

Since the receipt of the foregoing, the Doctor has had forwarded to him a communication, which, when read, will be found in affinity with the preceding.

Remarks on Hydrophobia, more particularly as it occurs in Dogs; in a letter from a gentleman of observation and experience in New-Jersey, dated March 15, 1822.

Sir—I lately read with much pleasure, in the New-York Spectator of the 1st instant, Mr. Middleton's letter to you accompanying Dr. Marochetti's very interesting report on the symptoms and cures of hydrophobia.

As I consider it the duty of every member of the human race, to communicate any thing that may in any way tend to elucidate or corroborate this wonderful discovery, (the greatest that has yet been made in medical science,) I beg leave to submit to your consideration two cases, which within these eighteen months have fallen within my personal knowledge and information, and may be depended on.

On the morning of the eighteenth of December, 1820, while living in Canada, a favourite dog, belonging to me, of the Setter breed, showed what I imagined to be symptoms of madness, on which I immediately directed my servant to tie him up in an out-house, and to give him some salt and water, as he appeared from *scratching his neck and throat until it absolutely bled*, to have something sticking in it; this made him in a short time throw up a quantity of yellow frothy matter, and seemed to relieve him very much, so that at 12 o'clock he appeared free from every species of complaint. Soon after, the servant gave him some water, which he lapped freely, and immediately threw up a large quantity of the same yellow frothy matter, some of it in large lumps. From these symptoms, I was induced to think that he had swallowed some poisonous substance, on which account I gave him some milk and water and fat mutton broth, which he took freely, and appeared as if sensible of the attention paid him, and as usual wagged his tail, and readily obeyed every order I gave him.

Next day his appearance was more unfavourable: his eyes appeared glazed and heavy, his tail drooped, his stomach and bowels were contracted, his back raised in a circular form, and *his neck raw from continual scratching*. At this time I had him and the barrow in which he lay removed to a warmer place, which I did without any difficulty, as he knew and obeyed me as usual; yet, soon after, when I held out my stick towards him, he laid hold, and left the marks of his teeth in it. In the evening I gave him some more milk and water, and mutton broth, which he took freely and went to rest.

About midnight I was awakened by his incessant and apparently painful barking, which he continued without intermission until daylight, when he exhibited what appeared to me such undoubted signs of violent madness, that I was under the painful necessity of shooting him. My servant then told me, that the day I desired him to be tied up, he made a snap at his thigh, and gave it a pinch, but having on thick pantaloons, and drawers, he did not break the skin, and no bad consequences have ensued from it.

When staying last August with my friend, Mr. Grant, at Montreal, I happened to mention all these circumstances to him, when he, pointing to a favourite dog, lying at his feet, told me, that about two years ago he was in so similar a situation, that he left orders with his servant to shoot him, and as he could not do it himself, or be in the way when it was done, he went into the country for some hours. On his return home, the first question he asked was, "have you disposed of the dog?" to which, to his *great surprise*, the servant answered, "No, sir, I could not find in my heart to kill the poor dumb brute, and as he seemed by his *violent scratching* to have something in his throat, or mouth, that caused his illness, I got a friend to assist me, who held him down while I opened his mouth for the purpose of examining it, and his throat, when *under his tongue*, I observed a large *Blob or Tumour*, which I opened with a penknife, and out of it came a great deal of nasty matter, which the dog threw out of his mouth, immediately leaped up, frisked about the room as if sensible of the cure that had been effected on him, and he is now as well as ever he was." Mr. Grant could hardly believe the story; but the entrance of the dog into the room, *in his usual manner*, to his great joy, confirmed the truth of it.

On Mr. G's relating these circumstances to me, I mentioned to him, that I thought the matter of so great consequence, that he ought to draw up a statement, and communicate it to some medical friend, as it might, perhaps, be the means of finding out a cure for the distemper in dogs, which I *then* thought it was, though was convinced, from Dr. M.'s report, that it was the real hydrophobia.

As I soon after left that country, I do not know whether or not Mr. G. followed my advice; but in case he has not, I now give you all the circumstances of both cases, well convinced that they cannot be placed *in better hands;* leaving you at liberty to make such use as you may think proper of this information.

As Dr. M. mentions having the hands *properly* covered when examining the mouths of patients, I would beg leave to suggest your publishing what material you deem a proper and necessary covering for the hand; with which, and a lancet, at least one person in each village, or large family, ought, *in case of accidents,* to be provided, as there are many parts of this extensive country, where medical aid cannot be procured, or the patient unable to pay the expense of the long attendance necessary. And I would also beg leave to suggest the propriety of having this report of Dr. M.'s promulgated throughout the country in general, through the medium of newspapers or cheap pamphlets, with the addition of such remarks as you may think proper or necessary to make to it.

When I was a boy, at school in the North of England, I learnt to *worm* dogs, which, *it was said,* did not prevent their going mad; but in case they were infected, occasioned a relaxation or paralysis in the lower jaw, which disabled them from biting any thing, and under that idea, I afterward wormed a number of dogs, but cannot, at this distant period, say what were the consequences or effects of it; but as the custom was general, there must have been something in it, and perhaps might have proceeded from the idea that the tongue was *somehow afflicted.* That the saliva of a mad dog will not communicate the disease, unless carried into the circulation through a wound in the skin, I am perfectly convinced, as a lady, a friend of mine, had her face licked all over by a favourite grayhound, which had been tied up on account of being supposed to be infected, but got loose, and immediately after being again tied up, got loose a second time, and ran off, and, before he was killed, bit a number of dogs and cattle, *all* of which went mad, yet the lady never felt any bad consequences from it.

With real esteem, I have the honour to be,

Sir, your most obedient,
Humble Servant,
W. ARMSTRONG.

S. L. Mitchill, M. D.
March 26, 1822.

LITHOTOMY. What I have to say at present upon this article, is founded upon two lately-discovered anatomical facts, which, in my opinion, will become of the first consideration in regulating the operation of lithotomy. The first of them has reference to the particular extent, thickness, and connexion of the triangular ligament of the urethra; and the second to the pelvic partition, or that extension of the fascia iliaca, which passes over the brim of the pelvis to become attached to the side of the urinary bladder, and called ileo-vescial-fascia.

"The triangular ligament of the urethra is stretched across the arch, between the rami of the pubes at the anterior edges of these bones. It is connected above, to the middle of the lower edge of the pubic ligament, by which a space is left on each side, for the passage of the internal pupendal arteries to the penis.

This ligament is about an inch and a half in depth, having its lower edge semilunated, and formed into two arches, both sprung from a central projecting portion of the ligament, which will be afterward mentioned as the *centre of union of the muscles of the perineum.* These arches are concave facing the coccyx, and go towards the tuberosities of the ischia, by processes firmly attached to the inner edge of the bone, and that terminate by being incorporated with the anterior sacro-sciatic ligaments.

This branch of the triangular ligament, moreover, assists the sacro-sciatic on each side, in sending up, within the pelvis, the aponeurosis to the obturator internus muscle.

The central projecting point, at the lower edge of the triangular ligament, is kept in its place, in giving form to these arches, by the action of the sphincter ani, and transversales perinei muscles.

At about the middle of the triangular ligament is a hole, for the urethra, in its passage from the bulb.

The triangular ligament is composed of two very distinct laminæ, which are naturally separated at some distance from each other, in consequence of having between them, the glandulæ anteprostatæ, or Cowper's glands."—*Surg. Anat.*

By this description, I wish it to be understood, that the triangular ligament of the urethra is closing the outlet of the pelvis for a great extent under the arch of the pubis; and that, at its upper part, it is full half an inch thick, getting gradually thinner towards its arched edge, at its under part.

Now, in almost every book which contains directions for the operation of lithotomy, we are told to "cut through the common integuments by the side of the rapha of the perineum, against the groove of the staff, which is to be the first incision; then to divide the transversales perinei muscles, which is the second incision; and after this, to feel for the groove of the staff, in the membranous part of the urethra, to cut upon it, and to introduce the beak of the instrument, that is to divide the prostate gland. Hence we find surgeons getting into the bulb of the urethra instead of the membranous part; from their attention not having been directed to the presence of the thick triangular ligament. After this, by carrying the beak of their instrument on, they cut the bladder and prostate, and prepare to introduce the forceps for the extraction of the stone, without having made sufficient room for its exit. The bare hint at this circumstance will sufficiently account for the pulling and twisting we every day see and hear tell of, during the effort to extract even very small stones by the lateral operation. I have seen a patient, under such circumstances, sent from the operating table of a large hospital, who died, soon after two hours had been spent in vain efforts to extract not a very large stone, from the urinary bladder.

The French surgeons, from having often met with these difficulties, choose at length to dignify the accident by a particular epithet; not however for the purpose of guarding against it, but that the world might know they had invented a new operation for lithotomy, which they called l'operation par deux temps: that is, wherein the patient, found exhausted by the laborious efforts to extract the stone by the forceps, at the time of the operation, was put to bed, in order to recruit for another trial the following day. *L'operation par deux temps!*

The Pelvic Partition. I believe nine out of ten of the cases of death after lithotomy, are to be attributed to peritoneal inflammation, caused by extravasated urine retained in some quantity against the under surface of the peritoneum, as it passes from the bladder to the rectum and side of the pelvis.

I have taken some pains, in the first part of a System of Surgical Anatomy, published this year, to describe the particular connexions of the iliac fascia with the side of the urinary bladder, and to show that a complete septum is formed by this membrane at each side, which is impenetrable by any aqueous fluid; and by its peculiar attachments, a pit exists at the side of the back part of the bladder, which is bounded below by this fascia, and above and behind by the peritoneum, as it goes from the bladder to the side of the pelvis. That this pit is likely to be filled with urine, during the incision into the bladder in the operation for stone; and that, when urine is here placed, it has no possible way of escape but by absorption. When urine is in this situation, therefore, it is in constant contact with a considerable extent of surface of peritoneum; and that, under such circumstances, it is equal to produce erysipelatous inflammation of the membrane, no one will deny.

I think it can be demonstrated by fair induction, that, from the time of Celsus to the present day, the different operations of lithotomy were successful in proportion as this pelvic partition remained uncut. The fatality attending Mr. Cheselden's first operation, is to be ascribed to the *urinal infiltration*, consequent upon the manner in which he divided the bladder. He cut upwards, and necessarily wounded this partition. We are permitted to draw this inference, especially as Mr. Cheselden has not accounted for such events in any other way. The high operation has been laid aside from being so often unsuccessful; and, in all the descriptions given of that performance, we are left in the dark as to the cause; being only presented with accounts of its comparative ill success. The operation by the apparatus major, I have no doubt, was instituted in its day from a consciousness that something was cut in other operations, that ought not to be cut. Hence the method by dilatation was thought more adviseable.

[*Surg. Anat. Part I.*]

The result of my observations upon the structure of the parts within the pelvis, in reference to the division of the bladder and prostate in the operation of lithotomy, is this; that there is a line for this incision, which, when observed, the prostate gland can be completely divided, and the neck of the bladder beyond it, for the extent of two inches, with all safety to the patient, and without opening the pelvic partition, or wounding the peritoneum or vesicula seminalis; which line will be obtained by observing the following rule. The patient is to be placed on the table in the usual manner, tied hands and feet, and in that exact position in which he is ordinarily placed for the operation. Then let the knife, having entered the groove of the staff, be carried into the bladder, and the bladder and prostate divided, while the instrument is held in a line with the horizontal table on which the patient lies, that will give an angle of forty-five degrees.

NEEDLE, SURGEONS'. Every practitioner must have felt, even at the ends of his fingers, the inconvenience and difficulty attending the introduction through the skin of the common curved needle. The young student is almost sure to prick his fingers, in his first attempts at sewing up the dead body; although a large needle is then generally made use of. And in the living subject, when bringing parts together by suture, as in case of harelip, it is not always easy to introduce the common needle in the course we wish it, or do it at all, in any thing like a graceful manner. The needle is small, rolls between the fingers, and has its point coming out sometimes at a part at which we least expect it.

Dr. Miller, of Franklin, Massachusetts, has contrived a delicate instrument, which I think in every instance will be more efficient than the ordinary needle. It is a curved needle, with an eye about the eighth of an inch from its point, fixed into a straight handle, by which full power is had over the instrument. It is first introduced through both lips of integument, and then armed with silken ligature, when the thread takes the place of the needle as the latter is withdrawn.

OSTEO-SARCOMA. The following is an account of three cases in which extensive portions of the lower jaw were taken away for the removal of this disease; after previously tying the carotid artery, in each individual, by Professor Valentine Mott. Two of these cases were of successful issue, but the third was lost; from circumstances, however, which could not be fairly referred to the operation.

On the 12th Nov. 1821, being asked by Dr. Mott to see a patient of his with a curious disease on the right side of the lower jaw, I was shown an interesting young woman, by name CATHARINE BUCKLEW, of about 17 years of age, of healthy appearance, good constitution, and who gave of herself the following account.

She stated that at about two years previous, a swelling commenced behind the last molar tooth, attended with acute pain about the angle of the jaw, that continued for three weeks; at which time the inflammation left her, without any evident resolution. During this attack there was no inflammation of the integument, nor could any pus be discovered, either on the cheek or about the bone within the mouth. That some domestic applications were made use of to the cheek, but the swelling remained, assuming the appearance of smooth and hard bone. That, at about twelve months after its commencement, she applied to a physician in New-Jersey, (it being her residence,) who advised blisters to the cheek, with the topical application of caustic to the tumour, together with a general antiphlogistic constitutional treatment: and that this was persisted in for two months without any benefit.

Soon after this she came to the city, and put herself under the care of Dr. Mott, in the New-York Hospital, when the tumour had extended from the root of the coronoid process to the second bicuspis tooth, being elevated nearly an inch above the level of the teeth, and spreading considerably wider than the alveolar processes. Its appearance was smooth, and to the touch somewhat elastic, though firm. Dr. Mott made an incision on each side the alveolar margin, with a scalpel, by which he was enabled pretty readily to remove the tumour to a level with the jaw bone. The tumour, upon examination after removal, was found to contain many cartilaginous and osseous spiculæ; and in its substance one of the molar teeth was imbedded, in a perfectly sound state. About three months after this a small sprout, which had grown rapidly, was taken off; she upon this removed to the country, where she remained in a very comfortable state for several months.

At the time I saw her, she further stated, that the first molar tooth came away early in the disease; that the second soon followed; after which, three or four of the other teeth at that side of the jaw; and that previously to this disease, she had never a decayed tooth: and further, that no fluctuation was to be felt at any time in the tumour; had no constitutional symptoms as the effects of this disease, nor any inordinate headach on that side. The lymphatic glands of the neck were, however, swollen during the continuance of the inflammation, in the early period of the disease, but disappeared when the pain subsided.

When I saw her, at the date mentioned, the tumour had the same firm and slightly elastic feel, which was said to characterize it in its early stage, and involved all the right side of the inferior maxillary bone. Projecting outwards, it formed a great convexity of the cheek; upwards it was divided into two portions by a furrow made by the pressure of the teeth of the upper jaw; this was attended with a constant abrasion of surface and discharge, which, though offensive, did not appear to be acrid or irritating: downwards, it was nearly in contact with the thyroid cartilage; and inwards, it extended beyond the middle line of the mouth, pushing the tongue and uvula much to the left side.

The tumour, at the back part of the mouth, had encroached so much upon the passage leading to the fauces, and the pressure of the lower part on the pharynx was so considerable, that deglutition became difficult; and from the great inconvenience attending mastication, she had been compelled for some time to subsist upon liquid aliment. Her speech was much interfered with, in consequence of the displacement of the tongue; but she had no pain in any part of the tumour.

Under all these circumstances, she was very desirous to be made acquainted if an operation could not be performed, which might extend to her some chance of life; observing, that if she continued in the present state much longer, she would soon be unable to swallow any thing, judging from the rapid growth that the tumour had shown for the few weeks previous; and fully aware of the dangerous nature of the novel operation her case would require, she expressed herself determined to submit to it, and hazard the consequences. The uncertain result of the operation was fully explained to her by Dr. Mott, and moreover that she might die under its performance; but that it was believed both practicable and proper.

After preparing the system for about a week, with a light diet and a few doses of neutral salts, the operation was commenced on the morning of the 17th. As it was thought prudent to begin by placing a ligature on the common carotid, this vessel was sought for at the middle of the neck, and one ligature placed around it. Very little blood was lost, and only one subcutaneous branch at the lower end of the wound required tying. Although she submitted to this part of the operation with firmness, yet immediately afterward she became pale and almost pulseless, with the presentiment that she should die if the operation of extracting the tumour was persisted in. In this her state of mental perturbation, it was resolved not to proceed; she was therefore put to bed.

After she recovered a little, she was apprized that what had been done, was only preparatory to the most important part of the operation; and that that would prove of little or no benefit to her if it was not further proceeded in. She was then urged to give the thing full consideration, and, if possible, to make up her mind to submit to the performance of the remaining part, which on no account should be deferred longer than the following day.

18*th*, 7 A. M.—Found her this morning much composed, having slept well, and free from fever. Upon putting the question, would she submit to the rest of the operation? she answered, with much decision, that she was determined to undergo it. She was, therefore, being cheerful and resolute, at ten o'clock placed again upon the table, when Dr. Mott proceeded with the operation in the following manner.

Feeling for the condyloid process, the incision was begun upon it opposite the lobe of the ear, and carried downwards opposite the ear, over the angle of the jaw, in a semicircular direction along the lower part of the tumour as it rested upon the thyroid cartilage, ending at about half an inch beyond the angle of the mouth, upon the chin. After this the second incisor tooth of the right side was extracted, which was from a sound part of the bone; and upon further separating the soft parts from the side of the jaw near the chin, a narrow saw, similar to a key-hole saw, was introduced into the mouth from the wound, by which was divided the jaw-bone in a perpendicular direction, commencing where the incisor tooth had been extracted. The lower part of the tumour was then laid bare by cutting through the mylo-hyoid muscle; when the flap of the cheek was carefully separated and turned up over the eye. This exposed fully to view the whole extent of the tumour, as it rose towards the os malæ. Now, after the integuments were cautiously dissected from the parotid gland, the masseter muscle was detached at its insertion, until the edge of this gland; then separating a few more fibres of the muscle under the gland, the parotid was readily raised without injury. The maxilla was next laid bare for some way above its angle, where it was seen sound and in a healthy state. To facilitate the sawing of the bone in this second situation, it was necessary to make a further incision through integument for about an inch close to the lobe of the ear, and over against the mastoid muscle. Then with a fine saw made for the purpose, smaller and more convex than Hey's, the bone was divided obliquely downward and backward, at a part about midway between the angle and condyloid process. This part of the sawing was necessarily performed with much caution, to avoid wounding the great vessels, and the inferior maxillary nerve. After the bone was sawed through, the action of the temporal muscle separated the coronoid from the condyloid process, and drew it up under the zygomatic arch.

An elevator was now introduced, where the bone was divided at the chin, by which the whole diseased mass was raised; and, with a scalpel passed into the mouth, the tumour was separated from the side of the tongue, as far back as the posterior fauces. The tumour could now be turned against the side of the neck, to assist its separation, from the parts below the base of the jaw, and from the pharynx. The pterygoid muscles were next detached, and the third branch of the fifth pair of nerves divided a little above the foramen at which it enters the bone, observing much caution to secure the safety of the trunk of the internal carotid, and deep-seated jugular, both of which were exposed.

At the several periods of this operation, the curved spatulas of Colles were found of infinite service, as in elevating the parotid gland, keeping the tongue steady, &c.

Very little blood was lost in this operation; three arteries only, of any size, required a ligature: viz. the facial, lingual, and a little branch behind and underneath the angle of the jaw.

After waiting for a little time to observe if any hemorrhage should ensue upon the reaction of the system: the flap of the cheek was brought down and closely approximated to the divided integuments below by three interrupted sutures; after which, adhesive straps, lint, compress, and a double-headed roller, being applied, the patient was made as comfortable as possible, and directed to be continued upon the table for a few hours to recruit.

At eight o'clock in the evening she had been removed to her bed, and signified that she was comfortable. Some reaction of the circulation had taken place; but there had been no hemorrhage. The pain from the operation she said was less than she had expected. For the first time since the operation she sipped three tea-spoonsful of cold water, and gave evidence by a nod that she could swallow. One hundred drops of tinct. opii was directed to be given if any twitching, more pain, or restlessness, should come on. She was recommended to make no effort to speak.

19*th*, 7 A. M.—She was found quite free of fever and irritation, and in every respect comfortable: she swallowed cold water by the tea-spoonful with but little inconvenience: she slept several hours during the night.

12 at noon.—She was found comfortable; skin moist; pulse less frequent, and soft: an enema was directed to be administered of soft soap and water; she had a little more difficulty in swallowing, but none in breathing.

9 P. M.—She was as well as in the morning; the enema had operated three times, and relieved her; pulse frequent, but not tense: she had taken about two ounces of cold water by the spoon since daylight.

20*th*, 7 A. M.—She had had a very comfortable night; instead of nodding, she answered yes and no to the several questions, in an audible whisper.

9 P. M.—She was much as in the morning.

21*st*, 9 A. M.—Was as comfortable as yesterday morning.

9 P. M.—There was no material alteration.

22*d*, 9 A. M.—An *enema* was directed to be administered as before. She was allowed to take, in addition to her cold water and teas, some thin chicken soup; and was, in every respect, doing well.

9 P. M.—Tumefaction of the lips and cheek very trifling, not enough to effect the least change in the lids of the right eye.

23*d*.—Was in every respect comfortable.

24*th*, 11 A. M.—Has made no complaint. The wounds were dressed, and union by adhesion had taken place in their whole extent, excepting about the ligatures and sutures. Suppuration having come on about two of the sutures, were removed. Pulse about 120.—The adhesive straps were renewed, with lint interposed between them and the double-headed roller.

25*th*.—Was every way comfortable. Pulse 120.

26*th*.—She said she had no complaint to make. Pulse 80. She was directed to take a small dose of sulphate of magnesia.

27*th*.—Spoke audibly, and said she was very well. Pulse about 84.

28*th*.—Was as well as before; the wounds were dressed; the two sutures at the upper part, near the ear, were removed; wounds appeared heated, at every part except where the ligatures remain upon the arteries. Pulse 80.

29*th*.—Felt very well; spoke distinctly; took freely of soup and other thin food. Pulse 100.

Dec. 3*d*.—Ligature from the carotid came away with the other three ligatures from the upper wound. A small collection of matter was evacuated from under the integuments in the lower wound, which had been produced by the irritation of the ligature.

4*th*.—Spoke and swallowed very well; wounds almost healed. Has used for some days a wash of spirits and water to the mouth, with a view to correct some fœtor of the saliva, and cleanse the mouth.

6*th*.—She was found dressed, and sitting in an adjoining room, reading by the fire. She looked and said she felt very well. The bandages being all left off, the only deformity apparent was a little more tumefaction of the right cheek than the left; wounds almost well; moved very readily the sound half of the under jaw. She was permitted to chew some animal food.

10*th*.—Wounds all healed; made no complaint.

March, 1822.—There was scarcely any perceptible deformity: the right cheek appeared, upon close examination, to be a little more depressed than the left; and some osseous deposit had commenced at the two situations at which the bone had been divided. Her health, in every respect, was perfectly good, and she enjoyed the free use of the left side of the lower jaw.

Mary Roe, a married woman, aged 22 years, came to New-York from Long-Island, on the 25th of March, 1822, to consult Dr. Mott concerning a tumefaction of the left side of her lower jaw-bone.

She stated, that about one year from date there appeared an enlargement of the bone, at a point from which one of the molar teeth some time before had been extracted. That it continued to increase gradually; but being at that time pregnant with her second child, and feeling little pain in the swelling, she took no particular notice of it. Since her delivery, however, which took place about six months before she came to the city, it has increased much more rapidly, but the pain remained as at first, and has been only felt occasionally to shoot through the part.

This disease was much less extensive than that in the preceding case, but it reached from the base of the coronoid process to the first bicuspis tooth, extending on each side of the bone to near the base, and as far back as the angle, at which part the base was comprehended in the disease. Several of the teeth had been thrust out by the growth of the tumour, and those which remained were very much displaced. The tumour had the same appearance and elastic feel of that in the former case.

On the 30th March, at 12 o'clock, Dr. Mott, assisted by Drs. Post, Burrowe, and myself, tied the left carotid artery through an opening of about two inches in length opposite the thyroid cartilage; and so little was the constitutional effect of this, that it was determined to proceed with the rest of the operation immediately.

An incision through the integuments was now made, as in the former case, beginning over the condyloid process above the meatus auditorius, and carried in a semicircular direction below the base of the jaw, to terminate upon the chin a little under the lip. The flap of the cheek being dissected up, the first bicuspis tooth was extracted to prepare the way for the saw; which instrument was then applied, and the bone divided in a perpendicular direction from that situation. The masseter muscle was separated from the angle of the jaw, and the parotid gland carefully elevated anteriorly, in order to exhibit the bone a little above the angle, that room might be made for the saw. The bone was now cut through midway between the processes and angle, in a line parallel with the zygomatic arch.

The bone was now raised at the chin by the finger and thumb, then detached from the parts within the mouth by a scalpel, until the diseased mass was completely removed.

During the elevation of the flap, and removal of the bone, the hemorrhage was profuse. At least a dozen ligatures were applied to bleeding arteries; some of the vessels bleeding equally free from both their extremities.

The patient bore the operation with undaunted firmness, the flaps of integument were brought together by several interrupted sutures, accompanied by adhesive straps and proper bandaging.

The operation occupied one hour and fifty minutes.

7 o'clock, P. M.—Pulse 88; nodded that she was comfortable; had slept 15 minutes, and was refreshed, but was sick at stomach, and had made an effort to vomit; ordered not to attempt to speak.

10 P M.—Had coughed some, which was followed by a discharge of fresh blood from the mouth, as well as from the wound, so as to come through the bandage, and run upon the neck. Pulse 88: had taken a little cold water by teaspoonsful

31*st*, 10 A. M.—Had a good night, but coughed hard several times, yet no more bleeding; felt much refreshed from sleep; pulse 92; skin natural; took 10 drops tinct. opii to allay cough, but nausea being the effect, was not repeated: to have cold barley water instead of common water, by the tea-spoonful.

April 1*st*.—Passed an uncomfortable night, owing to cough; pulse 92; was ordered *enema communis*, which was repeated in the afternoon with good effect. Five P. M. pulse 120 to 135; articulates a little, though indistinctly; was ordered a cough mixture.

2*d*.—More comfortable; pulse 88; all symptoms favourable. No tumefaction about the eyelids; cough less.

3*d*.—Felt refreshed; countenance good; no tumefaction of the face; articulated distinctly; pulse 88; complained of hunger. 8 P. M. pulse 80; cough was troublesome forepart of the day. *mixt. expect.* cont.

4*th*.—Said with a distinct and audible voice that she was better than at any other time since the operation; felt no pain in the wound; coughed less; but from the state of the bandages, the wound was cleaned and dressed. The parts were found to look well; pulse 92; felt hungry; was ordered some thin broth.

5*th*.—Had a comfortable night; took some chicken tea with much relish; pulse 104; no appearance of tumefaction. Had an enema this morning which operated well; cough much relieved.

6*th*.—Dressed; removed from the upper wound the sutures, and all the ligatures except one; parts looked well. The lower wound looked well; but there was little union there by adhesion, probably owing to cough; pulse 80.

7*th*.—Has been sitting up in bed a little; pulse 82; was ordered sulphate of soda in divided doses.

8*th*.—Improving daily; wounds doing well; the last ligature from the upper wound was removed; pulse 120. The increase of pulse probably owing to the operation of salts, which had just then taken place.

12*th.*—While the wound was dressing this day the ligature from the carotid came away; patient doing well; pulse 104.

15*th.*—The fœtor and disagreeable taste in the mouth very much gone, from the daily use of a weak spirit and water lotion. She was permitted to nurse her babe a little to-day, for the first time since the operation.

16*th.*—Wounds almost closed.

17*th.*—She felt satisfied that the wound within the mouth was completely healed.

20*th.*—Had been down stairs.

23*d.*—Was permitted to chew some animal food on the right side of the mouth.

28*th, Mid-day.*—Suppuration was observed in the course of the cicatrix of the upper wound. Upon opening the part with a lancet, the noose of one of the ligatures came away which had been left in the wound, the thread having been taken off before close to the knot.*

May 6.—Left the city this day, completely recovered, for her residence on Long-Island.

The last case, though not by any means the least, I have now to communicate.

Prince, a coloured lad, aged 18 years, was sent to Dr. Mott, from Middletown Point, New-Jersey, having an osteo-sarcomatous tumour, embracing the lower jaw-bone from the articulation of the right side, as far round as the alveolar socket, supporting the first molar tooth on the left, presenting in size an appearance equal to that of his head.

In giving his history, he stated that, at the age of twelve, an enlargement of the bone showed itself at the right side, opposite the situation of the second molar tooth, which was at first considered a gum-bile, but, gradually increasing, dislodged, one after another, the teeth in its neighbourhood.

When it had arrived to the size of a walnut, a lancet was put into it, but no pus or fluid issued. In 1818, (then as large as a goose's egg) it was again opened, and a small quantity of blood and matter was discharged. Lately, two or three small openings had taken place within the mouth, attended with a discharge of pus and ichor, at which places also were denuded several bony spiculæ, clearly characterizing the disease. Externally, and near the most depending part, an ulceration of the skin had shown itself, from which the tumour afforded a daily discharge of an ounce or two of matter; and this had been kept up for the several last weeks. By this opening, a probe could be passed for some distance into the substance of the enlargement.

From the great emanation which was present in this lad's case, there could be little hope entertained from the formidable operation which would be required to relieve him from such a mass of disease. Still, as he was about to perish, and being on his own part very desirous to take what little chance the means might promise, it was thought right to operate.

Having assisted Dr. Mott in this operation also, I had opportunity to observe the different steps of the performance.

May 15*th*, 1822.—At noon this day the doctor commenced by tying the right carotid artery, a little above the clavicle. This the patient bore well, being little exhausted; and after resting and refreshing himself with a little wine, he expressed his wish that the operation might be continued.

An incison was now begun opposite the *jugum temporale*, carried in a semicircular course over the most prominent part of the swelling, and terminated opposite the first molar tooth of the left side. Another cut of the same form, but of less extent, below this, left insulated a large piece of integument, in which was situated the ulceration. The flaps being then dissected from the tumour, the second bicuspis tooth of the left side was extracted, and the bone sawed through at this sound part, by the same instrument which had been devised for the other cases. Now raising with an elevator, and then by the thumb and finger, the bone, where sawn through, the diseased mass was cautiously dissected from the tongue, palate, and pharynx, until the joint upon the right side was exposed. The capsular ligament was then cut into, at the inner side of the joint; after which, the bone was easily removed from its articulation. In the course of this operation, very little blood was lost, it being necessary only to apply four ligatures.

The patient was much exhausted, as the operation, from the great extent of the disease, necessarily occupied a considerable time; and this was also favoured by his previous state of debility.

After he recruited a little, the flaps of the parts were brought together by several interrupted sutures, and upon applying adhesive straps with the double-headed roller, he was sent to bed.

This tumour weighed twenty ounces.

3 P. M.—Has continued to recover gradually from the shock of the operation.

5 o'clock.—Had a sleep of half an hour; awakened relieved; pulse regular and distinct.

8 o'clock.—Pulse 140, and regular; skin cool and moist; signified by a nod

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* The reader may apply this fact to what has been said in the Appendix of Vol. I. upon leaving ligatures under the skin for absorption, after amputation.

that he was more comfortable than he expected to be; had spoken pretty distinctly for several things, contrary to particular orders; swallowed some water from the spout of a teapot, but taken with much difficulty.

16*th*, 10 A. M.—Has slept quietly for the most of the night, and only took a little cold water once; skin of natural temperature; pulse 120, and stronger than last evening; nodded that he felt comfortable; was ordered a little cold water occasionally, but to take it as seldom as possible.

10 P. M.—Pulse 124, and fuller; skin pleasantly warm; articulated that he felt refreshed from sleep; swallows well, the fluid being conveyed into the posterior fauces by means of an elastic tube and bottle. Contrary to orders, rose from his bed to have an evacuation from his bowels, and pass urine; all which he accomplished without difficulty.

17*th*, 10 A. M.—Had a good night. Pulse 120; skin natural; swallows with more difficulty; and some of the liquid passes through the wound. Bandage was removed, and all the dressings adjusted anew; slight cough.

9 P. M.—Said he was as comfortable as in the morning. Pulse 124. Has slept considerably during the day, and expressed himself as much strengthened by it.

18*th*, 10 A. M.—Passed a good night; is quite as well as yesterday; swallowed better; pulse 130.

10 P. M.—Was not so well as in the morning. Pulse from 135 to 140. Coughed more frequently, with hurried respiration; was restless, and felt faint at times; *in the course of the afternoon, during a very heavy lightning-storm, he suddenly fainted*, and appeared threatened with immediate dissolution: but after a short interval, revived by the use of volatiles and fanning; said he felt considerable pain in his left side, which prevented him from taking a full inspiration; he described every breath as painful to him, which was also evinced by the distress of his countenance; was ordered a blister immediately to his side.

19*th*, 10 A. M.—Relieved by the blister; slept considerably during the night; had fainted once during the night. Dressed the wound; more than two-thirds of it had united by adhesion. Breathing better. Pulse from 132 to 140. Cough less troublesome; swallowed some chocolate.

In the course of this day, however, his breathing became more troublesome, with great anxiety and restlessness; and at 4 o'clock in the afternoon, after two or three faint turns, he expired.

Anxious to be satisfied of the cause of his sudden death, I examined the body. I found the wounds, the result of the operation, healthy, and united by adhesion throughout the most of their course.

Upon raising the sternum, I found in the anterior mediastinum a massy deposit of coagulable lymph, seemingly of recent exudation; this was of a yellowish hue, having the exact appearance of pus, but wanting fluidity. In the cavity of the pericardium was contained a pint of yellow serum; and each lung exhibited marks of high inflammation; the surface of both lungs was of a florid, and in some places a deep purple hue. There was, however, in no place any adhesion between the lung and the side of the chest.

The conclusion I have drawn from this examination, coupled with my acquaintance with the more particular circumstances of this man's case is, that his death was to be attributed to inflammation of both lungs, *caused by lightning*.

As I am informed these cases are yet to appear before the public in a more detailed state, I shall content myself with this one remark:—I believe an important practical fact has been confirmed by these operations; namely, that the tying of the common carotid previously to any other part of the operation in these individual cases, did prevent hemorrhages during the performance, which would have so interrupted the surgeon that he might have been unable to proceed. But moreover, that tying these arteries low down in the neck before the other part of the operation, and not their branches, as they might have been from time to time cut in the course of the operation, did prevent an excess of inflammation during the cure; which, as can be imagined, might have extended to the brain and its membranes, and been the cause of death. At all events, might have protracted the cure, by effecting a long-continued purulent discharge, with emaciation, and much loss of strength to the patients.

About three weeks after Prince's death, an old gentleman came from Westchester, with a similar disease of the right side of the jaw, of considerable extent; but as he was of an irritable constitution, bad habit, and upwards of sixty years of age, he was advised to go home, and not think of an operation.

I have been (yesterday, December 11,) shown another case by Dr. Mott in a fine-looking boy of about nine years of age, from the neighbourhood of Corlaer's Hook, on whom it is purposed to operate in the course of the week. The disease is of three years' growth, and extends from the angle at the left side of the jaw to the chin.

It is probable, that had it not been for the successful issue of Catharine Bucklew's case, we should never have heard of the remaining four; proving that osteosarcoma in that situation, is not a novel disease; nor so rare as may have been hitherto supposed.

PESSARY. I have lately had presented me, by Dr. Barker of this city, a newly-constructed pessary for prolapsus uteri; for which he has just now obtained a patent.

That there was room for improvement in these instruments, no practitioner, to whose lot it has fallen to direct the application of those hitherto in use, can deny; and it will be admitted, that the common boxwood pessary, to say the least against it, is calculated to excite and keep up a debilitating discharge from the vagina.

Dr. Barker's instrument is a pyriform gum-elastic bag; having connected with its neck a valvular mechanism of ivory, for retaining such air as might be introduced to fill it, after it had been passed up the vagina. The pressure induced by such an instrument must be one as will most effectually answer the commanding indication; and can never be unpleasant or injurious to the patient.

There is attached to it a contrivance, by which the patient herself can fill it with air, and by which also she may empty it when it may be her wish to have it withdrawn. That this part of it, however, may not be improved upon, I am not so well convinced; but, as regards the instrument itself, it is undoubtedly the best, under the name of pessary, that has yet been submitted to the public; proved by the assurances of the numerous patients who have already put it to test.

PROSTATE GLAND. What I have to say upon this article, is, that I have never seen any thing like a third lobe, as described by Sir Everard Home to this gland in its healthy state: yet I have seen something like it behind the verumontanum, while the prostate was generally enlarged, although not tumefied in any other particular situation. And I will venture this explanation for the occurrence.

The prostate gland is surrounded by a tunic, derived from the posterior surface of the triangular ligament, and which, after strengthening the urethra at the membranous part, passes on to this gland, affording a covering equally dense with the tunica albuginea of the testis. But the prostate is not lined with any thing like this where it is pierced by the urethra: yet the verumontanum gives firmness to the anterior part of that groove. As the effect of a general inflammation of this gland, its whole substance will at first become gradually enlarged, and then, if the disease continues, a special tumefaction or elevation will show itself, projecting towards the cavity of the bladder behind the verumontanum, or in other words, at that part of the prostate which is wanting support from the dense tunic just spoken of. And when inflammation exists in that part of the gland exclusively, this peculiar elevation, or *third lobe*, may show itself without any general enlargement of the prostate gland.

TIC DOULOUREUX. Upon the operation for this disease I have had frequent conversations with my friend Professor Mott, who, as far as I can learn, has had more to do with it than any medical man in the country. He informed me that he had operated for neuralgia about fifty different times, with varied success; and has among other facts observed, that in cases wherein he had operated more than once, the interval of relief became less, in proportion as the operation had been often performed.

The inaugural dissertation of the late J. W. B. Murray, M. D., which contains a summary of Dr. Mott's experience up to 1816, the time of its publication, having fallen into my hands, I shall copy as much of it, as has reference to the operation for tic douloureux.

"The most strenuous advocate for the operation, in this country, is Professor Mott. His success has been so unequivocal, and his opportunities of witnessing the disease so comparatively numerous, that his unqualified opinion in all cases of Neuralgia, is '*divide the nerve*;' then, if necessary, employ the other remedies to destroy or diminish the susceptibility to return, which will be accomplished most certainly by hemlock and other narcotics. Dr. Mott has operated on five patients. He has divided different nerves on Dr. Jones's face *eleven* times, but the disease seems so rooted in the old gentleman's constitution, as to require frequent repetition of the operation. He has become so accustomed to it, that whenever the inveterate tormentor develópes itself, he sends for his surgeon without delay, knowing that from his hands he shall receive relief. Mr. George G. Graham, practitioner in Orange County, while a student of medicine, divided the infra-orbitar nerve with success; and Dr. Post, associated with Dr. Mott, operated lately on a gentleman, whose *left* cheek was diseased, and he instantly arrested the spasms.

The degree of certainty promised by the operation, as resulting from the physiology of nervous reunion, becomes an interesting question. Dr. Haighton's masterly and conclusive experiments on the reunion of divided nerves, have completely established that point: and it is a settled dogma in physiology, that by the growth of fresh matter, or by the approximation of the divided ends, the functions of a nerve are restored. Mr. Abernethy, however, arguing from the renewed sensibility and mobility of the ring finger, on which he operated, thought that the *anastomosing* branches had become enlarged, and, officiating in lieu of the original trunk, rendered a complete cure impracticable. Had that learned surgeon removed a portion of the *trunk* of the ulnar nerve, and then been baffled in his anticipated cure, his apprehension would be well founded. There is some difference between the effects of a divided trunk and of its branches. Nervous influence can readily be recommunicated by the preservation of the former, should the latter be effectually operated upon. Moreover, as the nerve of the opposite side of the finger was derived from the radial nerve, the difficulty of solving the mystery is diminished.

In opposition to the utility of operating, the uncertainty of *immediate* relief from a division of the nerve has been particularly urged. For, say they, the reunion is so speedy and so certain, that nature will commence her countervailing process before the desired object is completely attained; thus tantalizing the patient still more, and adding unnecessarily to his sufferings. The author of a thesis* supported before the Faculty of Medicine of Paris, expresses his doubts of the success of the operation; he pretends that it was repeated five times on one patient, and asserts that he finally owed his cure to the warm baths of Plombières.

In the same dissertation are the histories of two other patients, on whom a Parisian surgeon practised without success the division, and afterward the cautery on the supra and infra-orbitar nerves, the malar branches of the portio dura, and the mental nerve.† The preceding remarks on the success of the operation are a full reply to such objections.

Wherever a considerable portion of the nerve can be abstracted, a greater duration will assuredly be given to the cure. This cannot be attempted on many of the nerves of the face; because the ramification is so immediate and extensive, as to preclude a successful endeavour to remove much of the frontal, infra-orbital, or mental nerves. The branches of the pes anserinus are intimately connected with the parotid gland and duct; also by some very beautiful and extraordinary anastomoses with the other facial nerves, so that a similar hinderance occurs here. The only nerve about the head which affords the slightest chance for effectual and final division is the portio dura, in its passage between the stylo-mastoid hole, and the angle of the lower jaw. When the disease is in any other part of the system, if half an inch of the principal trunk supplying the affected spot could be removed, there would be little dread of its return. A repetition of incisions through a nerve, by insulating several portions, would be another means of protracting a renewal of the disease; and in the sub-orbitar nerve, this has been done by Dr. Mott, when operating on Dr. Jones.‡ This improvement, I believe, is attributable to Dr. Mott, and its application must be productive of decided and happy consequences.

It is a curious circumstance connected with the operation, that although the nerve shall be completely divided, from some cause, the chain of morbid actions will not be interrupted for several, perhaps twelve or fourteen, days. This has induced some to pronounce hastily, that the operation has failed. Any attempt satisfactorily to explain this occurrence, I think would be fruitless.

Operation on the infra-orbitar nerve.—The participation of this nerve in neuralgia, may be detected by the course of the pain up the side of the nose, sometimes following an arched direction between the eyebrow and upper lid, or in either the brow or lid, and extending along the zygomatick arch: or it may be confined to the muscles passing between the os malæ and the angle of the mouth, involving the buccinator and masseter. Pressure may be applied to the infra-orbitar foramen, during which the pain will be arrested, provided the disease depends on that nerve. A tremulous motion of the upper lip on one side, most commonly attends this variety of neuralgia.

To Dr. Haighton we are indebted for an excellent view of this nerve, and a delineation of the point for division. "He measured the space between the inferior edge of the orbit and the superior edge of the foramen in thirty skulls, and found the distance in sixteen skulls 1-4 of an inch, which he considers the medium distance from the upper part of the foramen; and if we allow 1-8 of an inch for the breadth of the foramen, and 1-8 below its inferior part, half an inch from the lower edge of the orbit will be a proper place for performing the operation. Having endeavoured to establish a rule for determining its distance from the orbit, it may be proper to ascertain its situation with respect to a line drawn from the *inferior part of the internal angular process of the os frontis*, obliquely across the orbit, to the *centre of the os malæ.* The measurement of this line in thirty skulls, did not vary more than 1-8 of an inch, and it was found that a line drawn downward perpendicular to this oblique line, at the distance of 7-8 of an inch from the internal angle of the eye, passed across the orifice of the sub-orbitar foramen."

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* Utrum in pertinacibus capitis et faciei doloribus aliquid prodesse possit, sectio ramorum nervi quinti paris? proponebat Veillart, 1768, conclusio *negativa.*

† Richerand Nosographie Chirurgicale, T. II. p. 204.

‡ Medical Repository, (*new series,*) Vol. II. No. 2

This point being settled, Dr. Haighton's direction for operating, is "to make an incision of 3-4 of an inch in length, carried obliquely downwards, (on account of the oblique course which many of these nerves take, in their passage from the foramen to the ala nasi,) the centre of which must correspond with the foramen, only 1-4 of an inch below it. The incision must be made down to the bone, otherwise we cannot be certain of dividing the nerves, as they are situated very deep."

The deformity produced by a large cicatrix, in this method of operating, exposes it to objection. Professors Post and Mott have employed the following mode with the happiest success, and perfect facility.

The only instrument required is a sharp-pointed bistoury, or phymosis knife, either in a stiff handle, or well secured.

Having ascertained the situation of the infra-orbitary foramen, by Dr. Haighton's rule, and also by the depression which can be distinguished in most subjects, let the nose be held aside by the assistant who secures the patient's head. Introduce the bistoury about midway between the nose and the nasal margin of the foramen; carry it down to the bone, and pass the point *close* to the bone, in order to get it under the nerve. The point must then be elevated a little, though it must not pass through the skin from beneath; by a little rubbing motion with one finger upon the point of the knife, at the same time cutting gently with the knife, the nerve will be divided.

As a considerable branch of the internal maxillary artery accompanies the infra-orbital nerve, its division will be shown by a copious arterial hemorrhage; and a peculiar acute pain accompanies the section of the nerve, in addition to the difference, perceptible to the operator, between cutting a nerve, and any other soft solid. The upper lip must now be examined by touch. If the patient acknowledge a destruction of sensibility the surgeon may withdraw his bistoury; otherwise, the cutting must be repeated, until from numbness, he is satisfied that the nerve is divided. By asking the question previously to withdrawing the knife, the patient has no reason to conceive that any disappointment attended the first attempt, and the repetition of incisions he may suppose to belong regularly to the operation.

Being certain that the nerve is thoroughly divided at the first point of section, make two or three incisions through it lower down; and thus endeavour, as Dr. Jones expresses it, to "insulate a portion of it, (included as it were in a parenthesis,) with respect to the common sensorium." Since the infra-orbitary nerve as it leaves the foramen expands immediately like a fan, and distributes its branches to the surrounding parts, the incisions last mentioned may be extensive, retaining the knife still underneath the skin. The knife is then to be withdrawn through the first opening, and the lips of this diminutive external wound can be drawn together, and secured by adhesive plaster.

The only obstacle to a free section towards the nose, is the facial vein, which, beginning at the inner angle of the eye, holds a diagonal course towards the angle of the jaw. A wound of this, however, will not be attended with any serious consequences: it will only add to the ecchymosis already arising from the artery, and can be compressed by a slight force applied to the spot. The suffusion of blood will be removed by absorption in a few days, and its removal may be aided by any moderately stimulating lotion.

The great advantage of this method over Dr. Haighton's, will be apparent from the impossibility of any large cicatrix being the consequence.

Operation on the Frontal nerve.—This final distribution of a highly useful and important branch of the trigemini, after it has entered the orbit through the foramen lacerum, appears to cling to the roof of the orbit, passing between the bone and the periosteum,* of course above the levator muscle of the upper eyelid. It leaves the orbit through the supra-orbitar foramen, which in many skulls is only a notch, closed below by a ligament. The situation of this hole or notch may be ascertained, with tolerable precision, by finding the sub-orbitar foramen; as it is about 1-4 of an inch *within* a perpendicular line drawn from the latter, and continued up the forehead.

Pass a bistoury or knife about 3-4 of an inch within the orbit, immediately beneath the superciliary ridge of the os frontis, and divide the nerve outwardly. A numbness must be felt on the forehead and eyebrow, and down the nose, before the knife is withdrawn. The connexion between the nerve and the bone is sufficient to impress the necessity of keeping the point of the bistoury as close as possible to the bone, and the dense periosteum affords additional resistance while dividing the nerve. The ophthalmic artery will bleed profusely for a few minutes, and when its flow outwardly is repressed, it will produce so much ecchymosis as to blacken the eye to a considerable extent.

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* Meckel. Tractatus Anatomico-physiologicus de quinto pare nervorum cerebri. Sec. xxxix.

Operation on the Mental nerve.—The foramen through which emerges the inferior-maxillary branch of the fifth pair, is situated generally about midway between the alveolar processes of the jaw and its base, in a line between the cuspidatus and anterior bicuspid teeth. The nerve may be divided by turning down the lip, and introducing the bistoury about the first bicuspid tooth, with the back towards the angle of the jaw. Keep the knife close to the bone, and by following the excavation of the jaw, the nerve will be divided by a cutting motion rather from the bone.

In the aged edentulous subject, from the absorption of the alveolar processes, no reference can be made to the teeth, in finding the mental foramen. It is situated generally in the same line with the supra orbitary hole, and consequently can easily be discovered.

Operation on the Portio Dura.—A mere description of the complicated and extensive distribution of this nerve, will be sufficient to justify a doubt of any operation being so devoid of danger, or troublesome consequences, as to authorize its performance.

When neuralgic sensations are traced from just above the angle of the jaw, in transverse lines across the face, upwards through the temples, downwards along the base to the symphysis of the chin backwards behind the ear; exciting especially a profuse discharge of saliva,* and frequently, from their severity, absorbing all perception of distinct linear direction, but communicating the idea of the whole cheek being in a paroxysm of neuralgia, a surgeon may pronounce the portio dura to be the affected nerve.

A brief display of the organs contained in the side of the face, seems necessary for the purpose of conveying a distinct view of the embarrassment and difficulty attending any projected operation on the portio dura.

The parotid gland, whose agency in furnishing saliva is superior to any other destined for that use, occupies the whole space from the mastoid process of the temporal bone, penetrating to the "very root of the external auditory sinus, almost to the internal carotid artery and jugular vein;"† it is sunk behind the lower jaw, and adheres to the pterygoideus internus muscle, while it reaches forwardly, by means of the socia parotidis, nearly to the anterior edge of the masseter muscle, and upwards to the zygoma. The ducts from its numerous lobuli unite, and are continued in one trunk to the buccinator muscle, which it perforates nearly opposite the second or third dens molaris. "Its course will generally be defined, by a line extended from the junction of the lobe of the ear and figured portion, to midway between the root of the nose, and the angle of the mouth."

The arteria transversalis faciei "is generally placed midway between the parotid duct and the zygoma. At this part it lies between the socia parotidis and the masseter muscle."

"The portio dura, when passing from the foramen stylo-mastoideum, lies behind the parotid gland; but it immediately dips into its substance. It continues a single and undivided trunk, for about half an inch of its course. This part of the nerve runs in a slanting direction, downward and forward, imbedded in the gland. Where the portio dura is escaping from the skull, it is deep-seated, and nearly in contact with the arteria posterior auris, and where that artery and the occipital arise by a common trunk, the latter vessel is quite in the vicinity of the portio dura. By the styloid process," (which is the barrier between the external and internal carotids,) "the nerve is separated from the internal carotid artery, and jugular vein. About midway between the ascending plate of the jaw-bone and the mastoid process, the portio dura is nearly opposite to the posterior facial vein, and the external carotid artery.

"It is at this point, at a place where the nerve is still deeply covered by the glandular substance, that it divides into its branches, which separately perforate the gland, to reach the cheek, and other parts on which they are to be distributed. The largest of these branches inclines upward and forward, and while still imbedded in the gland, it subdivides into a numerous set of twigs, which cover as with a net-work, the zygoma and the arteria transversalis faciei. The largest of these twigs runs nearly midway between the zygoma and the parotid duct. The other divisions of this nerve ramify over the face, and about the throat.

"The trunk of the nerve can be reached, with safety, only by an incision beginning at the very root of the mastoid process, and continued downward and forward, along the anterior margin of the sterno-mastoid muscle. The dissection, no doubt will require to be deep; but in performing it the surgeon will not experience much difficulty. The lobe of the ear will require to be pulled upward, and held forward, while prosecuting this dissection. In performing the dissection, the nervus superficialis colli will necessarily be divided, where entering the lower angle of the parotid. The glandular substance itself will be injured, and the arteria posterior auris will be cut across."*

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* I have not noticed this in any description of Neuralgia; but a moment's reflection, I think, will show, that a diseased nerve passing through the parotid gland, imbedded in its substance, must affect the flow of saliva from that gland.

† Surgical Anatomy of the Head and Neck, by Mr. Allan Burns of Glasgow.

In this manner, Mr. Burns has been in the habit of removing half an inch of the nerve on the dead subject; and Professor Mott, since the inestimable *Surgical Anatomy of the Head and Neck* made its appearance, has exhibited to his class of surgery the mode of performing the operation. It has never been attempted in this complete and radical manner on the living subject; although many incisions have been made in the cheek, for the purpose of dividing the branches of the pes anserinus. The outline that has been given of the anatomy of the face, exhibits the difficulty attending that procedure, and the infallible consequence must be troublesome, perhaps perpetual, salivary fistulas.

Should it be necessary, however, to divide any of the facial branches of the portio dura, it has been suggested by Dr. Mott, that it might by effected by introducing a bistoury, as in the other operations, and making the incisions in various directions beneath the skin. The prospect of an unpleasant result will be thus considerably diminished, and the fistula would probably admit of a more rapid cure.

A few observations on the propriety of employing caustic applications, will close the subject. If the object be to destroy every prospect of a recurrence of neuralgia, and if the patient will consent to an experiment, which, if successful, must effectually annihilate the nerve, the precedents afforded by the French surgeons will authorize the attempt. It has been objected, that the proximity of some of the nerves to the bone must necessarily involve exfoliation. This consequence depends, very probably, on the management of the caustic, which should not be left so long in contact with the bone as to endanger its continuity.

After the nerve has been divided by the operation, it may answer a good purpose to interpose caustic between the extremities of the nerve, and thus combine both expedients. The tediousness of reaching the nerve from the surface by caustic, besides the torture it would inflict, possibly producing tetanus, seem to interdict any proceeding different from that proposed. Dr. Jones declined the use of caustic, from dread of tetanus, nor was his fear without foundation. We should, however, repose some confidence in the practice of the French, and admit this method of destroying a nerve to an equal rank with the knife, in those cases where its employment is feasible, and unattended with danger to the bone.

Following this is a letter by the Professor to Dr. Murray, from which some additional information can be collected.

Esteemed Pupil,—Since a doubt has been expressed by some, as to the eventual result of the operation of dividing the nerve in Neuralgia, allow me to avail myself of this opportunity, to state the success which has attended it in my practice.

In a confirmed case of neuralgia, in a lady about 60 years old, in 1810, I divided the infra-orbital nerve on the right side; the relief was instantaneous. Before the knife was withdrawn, she exclaimed, "I am relieved, I can now speak, blow my nose, and swallow," which had been almost impossible for some days, owing to the unspeakable agony of the disease. There were slight neuralgic symptoms for about ten days, then she became perfectly free from the slightest trace of it, and has never since had a return severe enough to induce her to resort to the operation, the pain of which she by no means dreads: for all attest that a single paroxysm far surpasses the smart from the incision. For about four months she was entirely free from the disease.

A gentleman, aged about fifty, having had neuralgia for four years, applied to me, in the beginning of the year 1811, for surgical relief. Palliative means having failed, and the disease increasing in violence, I recommended the operation as the best and only remaining resource. I divided the infra-orbital nerve of his right cheek. The paroxysms continued for a day or two as frequent and violent as before the operation: but in a week it entirely left him. In about four months, the pain began to return, and increased in violence from time to time, but did not equal its former severity till about six months since, when it became more severe than ever. About three months ago I repeated the operation on the same nerve: the pain went off gradually in about a week, and he says the last operation is by far the most successful.

In 1811, I divided the right infra-orbitary nerve for a lady, who had been labouring under severe neuralgia for two or three years. She experienced no *immediate* relief; on the contrary, the paroxysms appeared to be increased in frequency, and aggravated in violence, for several days: they then began to decline, and had entirely left her about the twelfth day. *I believe the disease has never returned.*

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* Surgical Anatomy of the Head and Neck.

On that highly respectable physician, and victim to neuralgia, Dr. Jones, of this city, I have operated about eleven times, and in every instance with the most perfect success.

After having been afflicted with this horrible disease for seven or eight years, and having exhausted all the resources of the Materia Medica to no purpose, the doctor at last yielded to my frequent and earnest importunities, and allowed me to divide the right infra-orbital nerve, at the advanced age of sixty-seven years. His pains were increased for several days, but about the twelfth they abated gradually, and in a few days completely left him. He continued for four or five months free from pain; but after exposure to cold, he felt now and then alarming touches of the disease, which at length became very violent. Every subsequent operation on the infra-orbital and mental nerves, has been followed with complete relief; but the intervals have been mostly shorter than the first; they do not, however, gradually shorten; several of the last operations have varied very little in the interval of ease, it being of from three to four months duration.

The violence of the paroxysms has several times been augmented for a day or two after the operation, and as the additional irritation of the division of the nerves subsides, the pain gradually diminishes. The disease always leaves him in from seven to twelve days after the operation. From the last division, however, of the infra-orbitary, about three weeks since, he received immediate ease, having scarcely a single pain afterward.

Last winter, I divided the right infra-orbital nerve for Major B——, aged about fifty, who had been labouring under a regularly increasing neuralgia for about four years. The operation increased his disease in every respect for several days; it then abated, and gradually went completely off in about the usual period of twelve days. Four months and more have now elapsed, and the disease has not returned.

About three weeks since, I attended, in conjunction with Dr. Post, a Colonel K——, aged about sixty, who for five years had been afflicted with severe neuralgia of the left infra-orbital nerve. Dr. P. divided this nerve, and it was followed with immediate relief. He experienced little or no pain afterward.

Hoping that all the miserable victims of neuralgia may be encouraged to resort to a surgical operation, either in the form of a simple or double division; by a single external incision, or, where practicable, the removal of a portion of the nerves,

I am, with sentiments of high regard and esteem,

VALENTINE MOTT.

5 *mo.* (*May*) 1*st*, 1816.

TOURNIQUET. Notwithstanding all the encomium justly paid to the screw tourniquet of M. Petit, that instrument seems superseded by one of American invention. I could never bring myself to believe, that a sufficient pressure could be obtained against the artery by the pad of that instrument, while applied as directed in the text; viz. the tourniquet itself being upon the extremity in an opposite direction, without producing much more general constriction of the limb than was to be desired. On this account, I have been in the habit of dispensing with the ordinary pad, and substituting a small and firm single-headed roller under the base of the instrument, and placing the whole over the artery. Whether it was merely ideal or not, I will not pretend to answer; but certainly patients were much better satisfied by this method of applying the instrument.

The tourniquet invented by Dr. Moore, of Massachusetts, appears to answer in a most excellent manner this design. It is made of brass, and intended to be applied over the artery. It has a pad of metal, of an oval convex form, that can be projected from the under part of the instrument by the operation of a male and female screw, which is morticed in a frame, also of brass, for the purpose of its support, and for giving it a proper direction. There may be a linen compress between this pad and the limb, or the brass pad may be covered by a piece of shamois leather, gathered around it for the time, after the manner that tailors cover buttons. The strap of this instrument is intended to buckle on the outside of the limb; and to prevent the skin from any unpleasant sensation, there is a piece of leather placed under the buckle analogous to that for the under part of Petit's screw tourniquet.

TRUSS. I am at a loss to divine why Mr. Cooper has altogether omitted the mention of the truss of Messrs. Salmon, Oddy, & Co. of London, which does appear to me as infinitely superior to any now in use, or likely to be contrived.

There are two very formidable objections that I think must obtain, against all the trusses, with that exception, and they are the following: When the pad is firmly connected with the steel strap, it is clear, that in the different positions of the body, and constantly during progressive motion, pressure is made alternately by the one edge of the pad, then by the centre, or the other edge; and in proportion as the truss has been at first well applied, that is, with the more convex part of the pad against the ring, so the same centre of the pad may be the cause of strangulation of a portion of intestine or omentum, that should have been permitted to peep through the opening in the abdominal parietes, at a time when pressure was made by the edge of the truss. In this way I would explain the evils attributed to trusses. The truss I speak of provides against this accident, by having a ball and socket joint between the pad and steel strap, by which contrivance no other part of the pad can at any time make pressure but the very centre; and which, if in the first instance properly applied to the ring, must continue to make a fair and an equable pressure.

The other objection applicable to trusses in general, is derived from the circumstance of the strap which passes by the pelvis being in close contact with the body at that part; so that in progressive motion, when the muscles at the upper part of the thigh and outer part of the pelvis contract, the parts become for a time swollen, so that the pad is necessarily drawn from immediately over the ring. The consequence of this is, a protrusion of the hernia; against which the ball and socket joint, I have just alluded to, will not protect.

The truss, however, I would recommend, has a provision by which this occurrence cannot take place. The strap is not in contact with the pelvis, but takes a free course by its side, and can, for convenience sake, be laid against the soft abdominal muscles above the spine of the ilium; while from having a free motion with the pads by virtue of the ball and socket joint, it preserves at the same time a sufficient and most uniform pressure.

VARICOSE VEINS. From what I have seen in this country, the practice of Mr. Brodie seems to have been improved upon, by one more in conformity with that of the ancients.

I have reference to the excision of about an inch of the trunk of the principal superficial vein, which receives the blood from those in the varicose state. Last year, I witnessed this operation at the Philadelphia Hospital, on a man with extensive varices of the superficial veins below the knee. The vein in the ham, or the branch in that situation which was to become the saphena, was cut upon with a scalpel, and about an inch of its length extracted. The integuments were brought together by adhesive plaster, and in about three weeks all the varices disappeared.

I have been in the habit of puncturing these veins with a lancet, in several situations at the same time; and after they had bled freely, of dressing the limb with a compress and bandage, very systematically applied, moistening the whole three or four times within the first twenty-four hours with the rectified spirits of wine. By this treatment, the disease was very generally removed, provided it was not dependent upon constitutional circumstances.

END OF THE SECOND VOLUME.